

Docket No.: 11885-00075-US
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Gerald Hobisch et al.

Application No.: 10/565,014

Confirmation No.: 5437

Filed: January 18, 2006

Art Unit: 1796

For: UTILIZATION OF WATER-DILUTABLE
CONDENSATION RESIN AS WATER-
DILUTABLE DISPERSING AGENT FOR
PIGMENT CONCENTRATES

Examiner: M. M. Dollinger

APPEAL BRIEF

MS Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Appellants appeal the Examiner's decision rejecting claims 1 and 6, as set forth in the Final Office Action of August 26, 2010. As required under § 41.37(a), this brief is filed within two months of the Notice of Appeal filed in this case on December 22, 2010.

I. REAL PARTY IN INTEREST

The real party in interest for this appeal is Cytec Surface Specialties Austria GmbH, who acquired the entire rights in this application by assignment from the inventors, which was recorded on November 8, 2006 at Reel/Frame 018499/0577.

II. RELATED APPEALS AND INTERFERENCES

There are no other prior or pending appeals, interferences, or judicial proceedings known to Appellants which may be related to, directly affect, be directly affected by, or have a bearing on the Board's decision in this appeal.

III. STATUS OF CLAIMS

Claims 1 and 6 are presently pending and stand rejected. The claims on appeal are claims 1 and 6, which are reproduced in APPENDIX A.

IV. STATUS OF AMENDMENTS

Appellants filed an Amendment After Final Rejection on November 26, 2010. The Examiner responded to the Amendment After Final Rejection in an Advisory Action mailed December 6, 2010. In the Advisory Action, the Examiner indicated that Appellants' proposed amendments to claims 1 and 6 would be entered. As such, the claims on appeal and reproduced in APPENDIX A include the amendments to the claims filed on November 26, 2010.

V. SUMMARY OF CLAIMED SUBJECT MATTER

Of the claims on appeal, only claim 1 is independent. Reference to the present specification will be made to the Publication No. 2006/0183854 A1 to Hobisch et al. (hereinafter "Hobisch").

Claim 1 recites a method of use of water-dilutable condensation resins **AB** as dispersing agents for pigments. The method comprises mixing the pigments and the condensation resins **AB** to prepare pigment concentrates. *See e.g.* Hobisch ¶[0005].

In the case of inorganic pigments, 100 g of the pigment concentrate comprise from 40 g to 70 g of inorganic pigment, from 5 g to 20 g of the condensation resin **AB**, up to 10 g of a wetting agent and up to 10 g of a solvent. *See e.g.* Hobisch ¶[0027].

In the case of organic pigments, 100 g of the pigment concentrate comprise from 20 g to 40 g of organic pigment, from 5 g to 40 g of the condensation resin **AB**, and up to 10 g of a wetting agent and up to 10 g of a solvent. *See e.g.* Hobisch ¶[0027].

In the case of carbon black pigments, 100 g of the pigment concentrate comprise from 15 g to 30 g of carbon black, from 10 g to 30 g of the condensation resin **AB**, up to 10 g of a wetting agent and up to 10 g of a solvent. *See e.g.* Hobisch ¶[0027].

The condensation resins **AB** have an acid number of from 20 mg/g to 180 mg/g. *See e.g.* Hobisch ¶[0005]. The condensation resins **AB** are obtainable by condensation at a temperature of from 100°C to 220°C under formation of water which escapes at the reaction temperature. *See e.g.* Hobisch ¶[0024].

The condensation resins include components **A** containing acid groups and having an acid number of from 30 mg/g to 240 mg/g, which are copolymers of olefinically unsaturated monomers. *See e.g.* Hobisch ¶[005].

The monomers comprise monomers **A1** which contain acid groups and are chosen from alpha,beta-unsaturated carboxylic acids having 3 to 13 carbon atoms which are selected from the group consisting of acrylic and methacrylic acid, crotonic and isocrotonic acid, vinyl acetic acid, 3-propylacrylic acid, and 2-octenoic acid. *See e.g.* Hobisch ¶[0009], [0010].

The monomers also comprise monomers **A2** which are free of acid groups and are selected from the group consisting of alkyl esters of monobasic alpha, beta-unsaturated aliphatic carboxylic acids having 3 to 7 carbon atoms in the acid component and 1 to 20 carbon atoms in the alkyl component; the dialkyl esters of alpha,beta-unsaturated aliphatic dicarboxylic acids having 4 to 8 carbon atoms in the acid component and 1 to 20 carbon atoms in the alkyl component; the nitriles of the acids mentioned; the hydroxyalkyl esters of the monobasic alpha,beta-unsaturated aliphatic carboxylic acids mentioned having 3 to 7 carbon atoms in the acid component and 2 to 20 carbon atoms in the hydroxyalkyl component, also including oligo-oxyalkylene glycol monoesters having a number-average degree of polymerisation of from 2 to 50, the alkylene groups of which are selected from the ethylene and 1,2-propylene groups and mixtures thereof; and the vinylaromatics and the vinyl esters of saturated aliphatic linear and branched monocarboxylic acids having 2 to 20 carbon atoms. *See e.g.* Hobisch ¶[0011].

The monomers **A2** are employed in mass fractions of from 67 % to 90 %, based on the mass of the monomer mixture of **A1** and **A2** and **A3**. *See e.g.* Hobisch ¶[0011].

The monomers also comprise and monomers **A3** which are mono- or polyunsaturated fatty acids having from 14 to 30 carbon atoms in the alkyl groups or esters thereof with aliphatic alcohols having from 1 to 20 carbon atoms in the alkyl groups, which monomers **A3** are present in the monomer mixture of **A1**, **A2**, and **A3** in a mass fraction of up to 50 %. *See e.g.* Hobisch ¶[0012].

The condensation resin **AB** also includes hydrophobic polyesters **B** obtained by polycondensation of aliphatic monobasic and dibasic carboxylic acids **B2** having from four to forty carbon atoms, and dihydric aliphatic linear, branched or cyclic alcohols **B1** having from two to twenty carbon atoms. *See e.g.* Hobisch ¶[0015]. The aliphatic monobasic acids are fatty acids. *See e.g.* Hobisch ¶[0021].

The polyesters **B** contain hydroxyl groups and have a hydroxyl number of from 20 mg/g to 300 mg/g and a number-average molar mass M_n of from 500 g/mol to 5,000 g/mol. *See e.g.* Hobisch ¶[0005].

The mass fraction of component **A** in the reaction mixture for the synthesis of the condensation resins **AB** is 30 % to 90 % and that of component **B** is 70 % to 10 %, with the proviso that the sum of the mass fractions of the two components always gives 100 %. *See e.g.* Hobisch ¶[0005].

VI. GROUND S OF REJECTION TO BE REVIEWED ON APPEAL

Claims 1, and 6 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over EP 0 272 524 A2 to Staritzbichler et al (hereinafter “Staritzbichler”), in view of US Patent No. 6,114,434 to Tuemmler et al. (hereinafter “Tuemmler”).

VII. ARGUMENT

Appellants submit that claims 1 and 6 are not obvious over the combination of Staritzbichler and Tuemmler for at least the reason that the Examiner has failed to establish a *prima facie* case of obviousness. Specifically, the Examiner’s motivation to combine is not an

articulated reason with a rational underpinning as required by *KSR International Co. v. Teleflex Inc.*, 82 USPQ2d 1385 (2007). Moreover, to arrive at the claimed invention, the Examiner proposes to modify Staritzbichler by excluding a component that is taught to be expressly required. No such motivation would exist for one of ordinary skill in the art.

Independent claim 1 is directed to a method of use of water-dilutable condensation resins AB as dispersing agents for pigments. The condensation resins AB comprises, in part, components A containing acid groups and hydroxyl group-containing polyesters B. The Final Office Action states that “Staritzbichler does not disclose the specific component A of the claims.” Final Office Action, page 4, paragraph No. 6. Thus, the Examiner relies on Tuemmler as disclosing the claimed components A containing acid groups. As further stated in the Final Office Action, “Tuemmler discloses water dilutable resins AB which are dilutable in water after neutralization and are the reaction products of A acid functional polymers and B water insoluble aldehyde or ketone resins obtainable by condensing aldehydes with urea [abstract].” Final Office Action, page 4, paragraph No. 7.

The Examiner then concludes that “[o]ne would have been motivated to use the preferred polycarboxylic polymer A from Tuemmler as the polycarboxylic acid polymer A of Staritzbichler because Tuemmler teaches that the polycarboxylic acid A features a high pigment binding capacity, is stable on storage, and undergoes little or no change in viscosity in the course of storage in the pigment pastes produced therefrom. Absent any evidence to the contrary, there would have been a reasonable expectation of success using the polycarboxylic acid A of Tuemmler to prepare the pigment concentrate of Staritzbichler.” Final Office Action, page 6, paragraph No. 8. Appellants disagree.

“[R]ejections on obviousness cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *KSR International Co. v. Teleflex Inc.*, 82 USPQ2d 1385, 1396 (2007) quoting *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006). Furthermore, the Examiner cannot selectively pick and choose from the disclosed parameters without proper motivation as

to a particular selection. The mere fact that a reference may be modified to reflect features of the claimed invention does not make the modification, and hence the claimed invention, obvious unless the prior art suggested the desirability of such modification. *In re Mills*, 916 F.2d 680, 682, 16 USPQ2d 1430 (Fed. Cir. 1990); *In re Fritch*, 23 USPQ2d 1780 (Fed. Cir. 1992).

Appellants submit that the Examiner's stated motivation to combine the references as asserted is not an articulated reasoning with a rational underpinning and one of ordinary skill in the art would not have had an expectation of success in combining Staritzbichler and Tuemmler as stated by the Examiner. Contrary to the Examiner's assertions, Tuemmler does not teach that any advantage could be achieved by combining the polycarboxylic polymer A with the hydroxyl group-containing polyesters B taught in Staritzbichler. Tuemmler is specifically and squarely directed to component B being an aldehyde or ketone. For example, Tuemmler states in col. 1, ll. 46-48, "[i]t was the object of the present invention to provide water-dilutable resins **based on water-insoluble aldehyde or ketone resins...**" (emphasis added). Thus, the only advantage that can be gleaned from the use of component A taught in Tuemmler is with an aldehyde or ketone resin as component B. Tuemmler does not disclose or suggest that their component A could be useful in any other manner other than with an aldehyde or ketone resin. Moreover, all beneficial results obtained within Tuemmler require component B to be an aldehyde or ketone resin.

Unlike Tuemmler, no such aldehyde or ketone resin is involved in the present invention or in the invention of Staritzbichler. As such, there is no reasonable expectation for one of ordinary skill in the art to expect that any advantage achieved in Tuemmler by using component A would be successful in the invention of Staritzbichler. Likewise, as stated above, the Examiner has acknowledged that Staritzbichler does not disclose or suggest component A as claimed. As such, the Examiner's stated motivation to combine lacks an articulated reasoning with a rational underpinning.

Moreover, the references are not combinable as asserted because Staritzbichler teaches that component B also requires a urethane groups and in order to arrive at the present invention, the expressly required urethane groups of Staritzbichler would have to be excluded.

The first page of the machine translation of Staritzbichler as provided in the Final Office Action states “**The required urethane groups** develop with the proportionate reaction of the isocyanate compounds with a part of the hydroxyl groups of the PHV. By these reactions becomes also for this component required the [intrinsic viscosity] from 8 to 13 ml/g (DMF/20 degrees C) achieved.” (emphasis added). Based on these teachings, one of ordinary skill in the art would not have been motivated to remove a component that Staritzbichler expressly and unequivocally states is required.

Furthermore, Staritzbichler teaches that the urethane group is necessary to achieve the required intrinsic viscosity from 8 to 13 ml/g (DMF/20°C). Thus, if the urethane group is excluded one of ordinary skill in the art would believe that the required intrinsic viscosity in the invention of Staritzbichler might not be able to be achieved. As such, one of ordinary skill of the art would not have been motivated to exclude the urethane groups for fear of an unsatisfactory intrinsic viscosity.

For the foregoing reasons, Appellants submit that a *prima facie* case of obviousness has not been established and the cited combination fails to render claims 1 and 6 obvious. As such, Appellants respectfully request that the Honorable Board withdraw the 35 U.S.C. § 103(a) rejection and direct that a notice of allowance be issued.

VIII. CLAIMS

A copy of the claims involved in the present appeal is attached hereto as APPENDIX A.

IX. EVIDENCE

Evidence submitted pursuant to 37 C.F.R. §§ 1.130, 1.131, or 1.132 that is being relied upon for this appeal is provided in APPENDIX B.

X. RELATED PROCEEDINGS

As stated in section II, *supra*, no related proceedings have been or are now pending. Accordingly, no related decisions are provided in APPENDIX C.

XI. CONCLUSION

For these reasons, reversal of the obviousness rejections under 35 U.S.C. § 103(a) of claims 1 and 6 is strongly urged. Payment in the amount of \$540.00 to cover the fees required by 37 C.F.R. §§ 41.20(b)(2) for this Appeal Brief is submitted concurrently herewith. The Director is hereby authorized to charge any deficiency in the fees filed, asserted to be filed or which should have been filed herewith (or with any paper hereafter filed in this application by this firm) to our Deposit Account No. 03-2775, under Order No. 11885-00075-US, from which the undersigned is authorized to draw.

Dated: February 22, 2011

Respectfully submitted,

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APPENDIX A– CLAIMS APPENDIX

1. A method of use of water-dilutable condensation resins **AB** as dispersing agents for pigments, comprising mixing the said pigments and the said condensation resins **AB** to prepare pigment concentrates wherein in the case of inorganic pigments, 100 g of the pigment concentrate comprise from 40 g to 70 g of inorganic pigment, from 5 g to 20 g of the condensation resin **AB**, up to 10 g of a wetting agent and up to 10 g of a solvent; wherein in the case of organic pigments, 100 g of the pigment concentrate comprise from 20 g to 40 g of organic pigment, from 5 g to 40 g of the condensation resin **AB**, and up to 10 g of a wetting agent and up to 10 g of a solvent; and wherein in the case of carbon black pigments, 100 g of the pigment concentrate comprise from 15 g to 30 g of carbon black, from 10 g to 30 g of the condensation resin **AB**, up to 10 g of a wetting agent and up to 10 g of a solvent, wherein the condensation resins **AB** have an acid number of from 20 mg/g to 180 mg/g and are obtainable by condensation at a temperature of from 100° C to 220° C under formation of water which escapes at the reaction temperature, of components **A** containing acid groups and having an acid number of from 30 mg/g to 240 mg/g, which are copolymers of olefinically unsaturated monomers which monomers comprise monomers **A1** which contain acid groups and are chosen from alpha,beta-unsaturated carboxylic acids having 3 to 13 carbon atoms which are selected from the group consisting of acrylic and methacrylic acid, crotonic and isocrotonic acid, vinyl acetic acid, 3-propylacrylic acid, and 2-octenoic acid, monomers **A2** which are free of acid groups and are selected from the group consisting of alkyl esters of monobasic alpha, beta-unsaturated aliphatic carboxylic acids having 3 to 7 carbon atoms in the acid component and 1 to 20 carbon atoms in the alkyl component; the dialkyl esters of alpha,beta-unsaturated aliphatic dicarboxylic acids having 4 to 8 carbon atoms in the acid component and 1 to 20 carbon atoms in the alkyl component; the nitriles of the acids mentioned; the hydroxyalkyl esters of the monobasic alpha,beta-unsaturated aliphatic carboxylic acids mentioned having 3 to 7 carbon atoms in the acid component and 2 to 20 carbon atoms in the hydroxyalkyl component, also including oligo-oxyalkylene glycol monoesters having a number-average degree of polymerisation of from 2 to 50, the alkylene groups of which are selected from the ethylene and 1,2-propylene groups and

mixtures thereof; and the vinylaromatics and the vinyl esters of saturated aliphatic linear and branched monocarboxylic acids having 2 to 20 carbon atoms, the monomers **A2** being employed in mass fractions of from 67 % to 90 %, based on the mass of the monomer mixture of **A1** and **A2** and monomers **A3** which are mono- or polyunsaturated fatty acids having from 14 to 30 carbon atoms in the alkyl groups or esters thereof with aliphatic alcohols having from 1 to 20 carbon atoms in the alkyl groups, which monomers **A3** are present in the monomer mixture of **A1**, **A2**, and **A3** in a mass fraction of up to 50 %, on the one hand, and hydrophobic polyesters **B** obtained by polycondensation of aliphatic monobasic and dibasic carboxylic acids **B2** having from four to forty carbon atoms, and dihydric aliphatic linear, branched or cyclic alcohols **B1** having from two to twenty carbon atoms, the said polyesters **B** containing hydroxyl groups and having a hydroxyl number of from 20 mg/g to 300 mg/g and a number-average molar mass M_n of from 500 g/mol to 5,000 g/mol, and the mass fraction of component **A** in the reaction mixture for the synthesis of the condensation resins **AB** is 30 % to 90 % and that of component **B** is 70 % to 10 %, with the proviso that the sum of the mass fractions of the two components always gives 100 %, and wherein the aliphatic monobasic acids are fatty acids.

6. The method of use of claim 1, characterised in that the condensation resins **AB** are neutralised and dispersed in water before the mixing with pigments.

APPENDIX B– EVIDENCE APPENDIX

Exhibit	Description	Location in Record
A	EP Patent No. 272524 A	Reference cited by the Examiner in the Final Office Action dated August 26, 2010.
B	Machine Translation of EP 272524	Provided by the Examiner in the Final Office Action dated August 26, 2010.
C	U.S. Patent No. 6,114,434	Reference cited by the Examiner in the Final Office Action dated August 26, 2010.
D	Final Office Action	Entered into the record on mailing date of August 26, 2010.
E	Applicants' Amendment After Final	Filed by Applicants and entered into record on November 26, 2010
F	Examiner's Advisory Action	Entered into the record on mailing date of December 26, 2010

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APPENDIX C – RELATED PROCEEDINGS APPENDIX

None.

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EXHIBIT A

(12) **EUROPÄISCHE PATENTANMELDUNG**

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(51) Int. Cl.⁴: C09D 3/49

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(54) Verfahren zur Herstellung von wasserverdünnbaren Lackbindemitteln.

(57) Die Erfindung betrifft ein Verfahren zur Herstellung von wasserverdünnbaren Lackbindemitteln auf der Basis von Kombinationen einer wasserlöslichen Maleinatölkomponte und einer unter den üblichen Bedingungen wasserunlöslichen, modifizierte Harnstoffgruppen und Urethangruppen aufweisenden Polyhydroxylverbindung. Die Produkte zeigen gegenüber den Produkten des Standes der Technik eine wesentlich verbesserte Haftfestigkeit, sowohl gegenüber dem Untergrund, also einem metallischen Substrat oder einer Grundierung, als auch gegenüber Folgeschichten.

Die erfindungsgemäß eingesetzten Polyhydroxylkomponenten sind modifizierte Polyesterharze oder vorzugsweise Reaktionsprodukte aus Epoxid-Aminaddukten, Alkanolaminen, gegebenenfalls Polyolen und Polyisocyanaten. Die Produkte enthalten gegebenenfalls zusätzlich nichtmodifizierte Polyhydroxylkomponenten.

EP 0 272 524 A2

Verfahren zur Herstellung von wasserverdünnbaren Lackbindemitteln

Die Erfindung betrifft ein Verfahren zur Herstellung von wasserverdünnbaren Lackbindemitteln auf der Basis von Kombinationen einer wasserlöslichen Maleinatölkompone

5 verbesserte Haftfestigkeit, sowohl gegenüber dem Untergrund, also einem metallischen Substrat oder einer Grundierung, als auch gegenüber Folgeschichten.

Aus der AT-PS 328 587 ist ein Verfahren zur Herstellung von wäßrigen, ofentrocknenden Bindemitteln bekannt, bei welchem eine wasserunlösliche filmbildende Polyhydroxylverbindung (PH) und eine filmbildende Polycarboxylverbindung (PC) gemischt oder partiell kondensiert und anschließend mit organischen

10 Basen unter Salzbildung in den wasserlöslichen Zustand übergeführt werden. Die Produkte werden in Kombination mit Vernetzungskomponenten, wie Aminoharzen, verarbeitet. Obwohl diese Bindemittel wegen Fehlens des bei Lösungsmittelarmen Systemen auf Ammoniak-oder Aminsaltbasis auftretenden anomalen Viskositätsverhaltens ausgezeichnete anwendungstechnische Eigenschaften zeigen und Überzüge mit hervorragenden Eigenschaften ergeben, treten bei der Verwendung dieses Bindemitteltyps für wasser-

15 verdünnbare Grundierungen und insbesondere bei Verwendung als Bindemittel für Füllmaterialien Schwierigkeiten bei der Zwischenschichthaftung auf.

Als Füller wird bekanntlich die auf eine Grundierung, die gegebenenfalls durch Electroabscheidung erhalten wurde, aufgebrauchte Schicht bezeichnet. Sie dient vor dem Auftrag des Decklackes als Zwischenschicht, durch welche Fehler in der Grundierung ausgeglichen werden können und die für den nachfolgenden Decklack eine entsprechende Basis darstellen soll. Dieser Lackaufbau wird insbesondere in den

20 Automobilindustrie bei der Lackierung von Personenkraftwagen eingesetzt. Es ist klar, daß diese Zwischenschicht eine ausgewogene Eigenschaftscharakteristik bezüglich Haftung, Härte, Schleifbarkeit, Elastizität u. a. aufweisen muß.

Es wurde nun gefunden, daß diese Eigenschaften bei wasserverdünnbaren Lackbindemitteln auf der Basis von Mischungen oder partiellen Kondensationsprodukten wasserlöslicher Polycarboxylverbindungen und wasserunlöslicher Polyhydroxylverbindungen erzielbar sind, wenn eine Maleinatkomponente zumindest

25 anteilig mit einer Harnstoff- und Urethangruppen aufweisenden Polyhydroxylverbindung kombiniert wird.

Die vorliegende Erfindung betrifft demgemäß ein Verfahren zur Herstellung wasserverdünnter Lackbindemittel auf der Basis von partiellen Kondensationsprodukten einer nach zumindestens teilweiser

30 Neutralisation der Carboxylgruppen wasserlöslichen Maleinatölkompone und einer Polyhydroxylkomponente, sowie einer Vernetzungskomponente, vorzugsweise einem Aminoharz, welches dadurch gekennzeichnet ist, daß man

(A) 10 bis 90 Gew.-%, vorzugsweise 18 bis 40 Gew.-%, eines oder mehrerer Anlagerungsprodukte von Maleinsäure(anhydrid) an ungesättigte Öle und/oder Fettsäuren, deren Maleinsäure(anhydrid)anteil zwischen 10 und 30 Mol.-%, vorzugsweise zwischen 16 und 27 Mol.-% liegt und deren Anhydridgruppen mit

35 Wasser und/oder Monoalkoholen aufgeschlossen sind, mit

(B) 90 bis 10 Gew.-%, vorzugsweise 82 bis 60 Gew.-%, einer oder mehrerer wasserunlöslicher, filmbildender Polyhydroxylverbindungen, die zumindestens 30 % aus vorzugsweise fettsäuremodifizierten Polykondensations- und/oder Polyadditionsprodukten, welche pro 1000 g mindestens 0,5 Mol einer substituierten Harnstoffgruppe (-N-CO-N-), sowie Urethangruppen enthalten und eine Säurezahl von weniger als 5

40 mg KOH/g, eine Hydroxylzahl von 50 bis 300 mg KOH/g und eine Grenzviskositätszahl von 8 bis 13 ml/g, gemessen in NN-Dimethylformamid (DMF) bei 20 Grad C aufweisen, und bis maximal 70 Gew.-% aus Polyhydroxylverbindungen (C), welche vorzugsweise, mit Ausnahme der Anwesenheit von substituierten Harnstoffgruppen der Komponente (B) entsprechen, bestehen, bei 90 bis 150 Grad C bis zu einer

45 Grenzviskositätszahl (DMF/20 Grad C) zwischen 10 und 20 ml/g kondensiert, mit der Maßgabe, daß das Verhältnis der Grenzviskositätszahlen der Polyhydroxylkomponenten und der Polycarboxylkomponenten zwischen 1,4 und 2,7 liegt und das Endprodukt mindestens 0,3 Mol an substituierten Harnstoffgruppen aufweist.

Die Erfindung betrifft weiters die Verwendung der so hergestellten Kunstharzbindemittel zur Formulierung von wasserverdünnbaren Lacken, insbesondere von Grundierungen und Füllern (Primer Surfacers).

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Die filmbildende, nach Neutralisation wasserlösliche Polycarboxylverbindung (Komponente A) kann als makromolekularer Emulgator aufgefaßt werden, der nach der Vernetzung des Überzuges als integrierender Bestandteil am Filmaufbau beteiligt ist. Geeignete Ausgangsmaterialien für die filmbildenden Polycarboxylverbindungen, welche eine Säurezahl von 50 bis 280 mg KOH/g aufweisen, sind für die vorliegende Erfindung Additionsprodukte von Maleinsäure(anhydrid) an ungesättigte Fettsäuren, wie sie in den

natürlichen Ölen und deren Abkömmlingen vorkommen, sowie die analogen Additionsprodukte an solche Öle. Die Fettsäuren weisen eine Jodzahl von mindestens 110 auf und enthalten vorzugsweise zum überwiegenden Teil isolierte Doppelbindungen. Ebenso können auch die handelsüblichen niedermolekularen flüssigen Dien-(co)-polymeren, vor allem Polybutadiene als Additionspartner herangezogen werden.

Die Anhydridgruppierungen dieser Additionsprodukte werden für das erfindungsgemäße Verfahren in bekannter Weise entweder durch Wasser oder einwertige Alkohole aufgespalten. Die eingesetzten Polycarboxylverbindungen weisen vorzugsweise eine Grenzviskositätszahl zwischen 4 und 8 ml/g (DMF, 20 Grad C) auf.

Als Polyhydroxylverbindungen (Komponente (B) und (C)) werden wasserunlösliche, filmbildende Polymere eingesetzt, die durch die praktisch vollständige Abwesenheit von freien Carboxylgruppen gekennzeichnet sind, d.h. daß sie eine Säurezahl von weniger als 5 mg KOH/g aufweisen. Ihre Hydroxylzahl liegt zwischen 50 und 300 mg KOH/g.

Die Polyhydroxylverbindungen der Komponente (B) und (C) werden z. B. in bekannter Weise durch Kondensation von Polyolen, wie Monoäthylenglykol, Diäthylenglykol, Triäthylenglykol, Glycerin, Trimethylolpropan, Pentaerythrit, mit Polycarbonsäuren oder deren Anhydriden wie o-Phthalsäure, Terephthalsäure, Trimellithsäure, Bernsteinsäure, Adipinsäure, Sebacinsäure usw., gegebenenfalls unter anteiliger Mitverwendung von Monocarbonsäuren mit 5 bis 20 Kohlenstoffatomen, hergestellt, wobei die Polyole im stöchiometrischen Überschuß eingesetzt werden.

Als wesentliche Gruppen enthalten die Polyhydroxylverbindungen der Komponente (B) pro 1000 g mindestens 0,5 Mol einer substituierten Harnstoffgruppe, welche durch die Formel -N-CO-N- dargestellt werden kann. Daneben weist diese Komponente Urethangruppen auf.

Die Harnstoffgruppen werden durch anteilige Verwendung von sekundären Alkanolaminen, wie Dialkanolaminen und Alkanolalkylaminen, und anschließende Umsetzung der sekundären Aminogruppe mit Mono-, Di- oder Polyisocyanaten erhalten. Die geforderten Urethangruppen entstehen bei der anteiligen Reaktion der Isocyanatverbindungen mit einem Teil der Hydroxylgruppen der PHV. Durch diese Reaktionen wird auch die für diese Komponente geforderte Grenzviskositätszahl von 8 bis 13 ml/g (DMF:20 Grad C) erreicht.

In einer besonderen Ausführungsform werden als Komponente (B) geeignete Polymere durch gemeinsame Reaktion von Epoxid-Aminadduktverbindungen, Alkanolaminen, gegebenenfalls Polyolen und Polyisocyanatverbindungen hergestellt. Dabei können als Epoxidverbindungen sowohl Monoepoxidverbindungen, wie die handelsüblichen Glycidylester von KOCH-Säuren, z. B. der α, α -Dimethyl-C₈-C₁₁-monocarbonsäuren, als auch Diglycidylverbindungen, wie die Epoxidharze auf Basis von Diolen oder Bisphenolen, eingesetzt werden. Zur Erzielung der notwendigen Hydroxylzahl werden die Epoxidverbindungen vorzugsweise mit Dialkanolaminen umgesetzt. Als Polyole können auch entsprechende Präpolymere aus Diisocyanaten mit Diolen, Polyolen oder Alkanolaminen verwendet werden.

Die Alkanolamine bzw. Polyole und die Epoxidharz-Aminaddukte werden dabei in einem Verhältnis von 70 : 30 bis 30 : 70 eingesetzt. Durch die Reaktion mit dem Polyisocyanat wird die gewünschte Grenzviskositätszahl erreicht. Als Polyisocyanate werden die üblichen Diisocyanate oder Präpolymere mit freien NCO-Gruppen mit Polyolen, z. B. Trimethylolpropan eingesetzt.

Gleichfalls geeignete Polyhydroxylverbindungen, welche vorzugsweise als Komponente (C) eingesetzt werden, erhält man durch Copolymerisation α, β -äthylenisch ungesättigter Verbindungen, die freie Hydroxylgruppen tragen, wie Äthylenglykolmono(meth)acrylsäureester, mit anderen copolymerisationsfähigen Vinylverbindungen, wie Estern der Acryl- bzw. Methacrylsäure von einwertigen Alkoholen, Amiden der Acryl- bzw. Methacrylsäure, Styrol, Vinyltoluol und anderen Monomeren, soweit sie keine Carboxylgruppen tragen. Die Copolymerisate können auch geringe Mengen von Formaldehydkondensaten von Melamin, Harnstoff, Benzoguanamin, usw. einkondensiert enthalten.

Für oxidativ lufttrocknende Bindemittel ist, wie dem Fachmann bekannt ist, ein ausreichender Anteil an ungesättigten Fettsäureresten im System notwendig. Für erfindungsgemäß hergestellte Bindemittel, welche für lufttrocknende Lacke eingesetzt werden, soll dieser Anteil in der PH-Komponente nicht unter 30 % (Öllänge) liegen.

Für die erfindungsgemäße Herstellung der Bindemittel werden die Komponenten in einem Verhältnis von 10 bis 90 Gew.-% Polycarboxylkomponente (A) : 90 bis 10 Gew.-% Polyhydroxylkomponente (B + C) bei 90 bis 150 Grad C kondensiert. Vorzugsweise werden die Komponenten in einem Verhältnis von 18 bis 40 Gew.-% (A) : 82 bis 60 Gew.-% (B) eingesetzt. Das Verhältnis der Grenzviskositätszahlen der Ausgangskomponenten soll vorteilhafterweise einem Quotienten PH/PC zwischen 1,4 und 2,7 entsprechen. Die Endprodukte müssen pro 1000 g mindestens 0,3 Mol der substituierten Harnstoffgruppen enthalten.

Die partielle Kondensation wird bis zu einer Grenzviskositätszahl von 10 bis 20, vorzugsweise von 14 bis 18 ml/g (gemessen in DMF, 20 Grad C) geführt. Die Kondensationsreaktion wird anhand der Säurezahl, der Viskosität und der Wasserverdünnbarkeit des Reaktionsproduktes verfolgt, wobei im Verlauf der

Reaktion eine Abnahme der Säurezahl um bis zu 20 Einheiten erfolgt.

Die erfindungsgemäß hergestellten Kombinationsprodukte sind mit Wasser weitestgehend verdünnbar, wobei die wasserunlösliche Komponente PH durch die wasserlösliche makromolekulare Komponente PC in der Lösung stabilisiert wird. In einigen besonders bevorzugten Fällen sind die durch Wasserzusatz erzeugten Dispersionen oder Emulsionen im Verarbeitungszustand optisch klar und trüben sich erst bei viel stärkerer Verdünnung, die allerdings für den Verarbeitungszweck unnötig ist. Es ist darüberhinaus ein wesentliches Kennzeichen der erfindungsgemäßen Überzugsmittel, daß sie nach Verdunsten des Wassers und eventuell vorhandener Hilfslösungsmittel einen klaren Film ergeben.

Die erfindungsgemäß hergestellten Überzugsmittel können als Klarlack oder in pigmentierter Form aufgebracht werden. Als Vernetzungskomponente werden wassertolerante Aminoharze oder Phenolharze verwendet. Vorzugsweise werden Melamin-Formaldehydkondensate vom Typ des Hexamethoxymethylmelamins eingesetzt. Zur Pigmentierung eignen sich die üblichen Pigmente, Farbstoffe und Füllstoffe, beispielsweise Titandioxid, Eisenoxid, Ruß, Silikatpigmente, Lithopone, Phthalocyaninfarbstoffe u. a. Die Überzugsmittel können auch Hilfsstoffe zur Pigmentbenetzung, gegen Ausschwimmerscheinungen, Schaumbildung, Hautbildung oder Oberflächenstörungen enthalten. Übliche Additive sind auch Silikone zur Erhöhung der Kratzfestigkeit oder zur Erzielung besonderer Oberflächeneffekte.

Die folgenden Beispiele erläutern die Erfindung, ohne sie in ihrem Umfang zu beschränken. Alle Angaben in Teilen oder Prozentsen beziehen sich, sofern nichts anderes angegeben ist, auf Gewichtseinheiten.

Beispiel 1 :

PH-Komponente:

In einem geeigneten Reaktionsgefäß werden 105 g (1 Mol) Diethanolamin auf 80 Grad C erwärmt und portionsweise mit 250 g (1 Mol) eines handelsüblichen Glycidylestergemisches aus alpha, alpha-Dimethyl-C₉-C₁₁-mono-carbonsäuren versetzt. Die Temperatur wird bis zum vollständigen Umsatz der Oxirangruppen gehalten.

532 g (1,5 Mol) dieses Reaktionsproduktes, 53 g (0,5 Mol) Diethanolamin und 382 g Methylcelhylketon werden auf 75 Grad C erwärmt. Dann werden 300 g Toluylendiisocyanat gleichmäßig zugetropft und die Temperatur gehalten, bis der NCO-Wert auf 0 gesunken ist und eine Grenzviskositätszahl (DMF, 20 Grad C) zwischen 10,5 und 11 ml/g erreicht ist. Liegt die Grenzviskositätszahl bei einem NCO-Wert von 0 unter 10,5 ml/g, wird der Ansatz mit weiterem Toluylendiisocyanat in kleinen Portionen versetzt, bis der gewünschte Wert erreicht ist.

Anschließend wird der Ansatz mit 226 g Methoxypropoxypropanol verdünnt und das Methylcelhylketon im Vakuum abgezogen, bis ein Festkörpergehalt von 80 % erreicht ist. Das Produkt weist eine Hydroxylzahl von 130 mg KOH/g auf.

PC-Komponente:

165 g dehydratisiertes Rizinusöl und 135 g Leinöl werden gemeinsam 1 Stunde bei 250 Grad C umgeestert und dann mit 100 g Maleinsäureanhydrid bei 200 Grad C so lange umgesetzt bis das Maleinsäureanhydrid praktisch vollständig gebunden ist. Nach Kühlen auf 90 Grad C wird eine Mischung von 30 g deionisiertem Wasser und 3 g Triethylamin zugegeben und die Anhydridgruppen bei 95 bis 100 Grad C aufgeschlossen.

Dann wird der Ansatz mit Methoxypropoxypropanol auf einen Festkörpergehalt von 80 % verdünnt. Das Produkt weist eine Säurezahl von etwa 220 ± 20 mg KOH/g auf.

Erfindungsgemäße Kombination:

1130 g (904 g Festharz) der PH-Komponente und 283 g (226 g Festharz) der PC-Komponente werden bei 110 Grad C so lange kondensiert, bis eine Grenzviskositätszahl von 16,5 ml/g (DMF, 20 Grad C) erreicht ist. Anschließend wird der Ansatz mit 56 g Dimethylethanolamin partiell neutralisiert und mit deionisiertem Wasser auf einen Festkörpergehalt von 33 % verdünnt.

Das Produkt weist einen Anteil an substituierten Harstoffgruppen von 0,5 Mol/1000 g Festharz auf und ergibt nach Abdunsten der flüchtigen Anteile einen klaren Film.

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Lacktechnische Prüfung:

(a) In einer Perlmühle wird in bekannter Weise eine Pigmentpaste aus 127,3 Tlen der oben beschriebenen 33%igen bindemittellösung, 27 Tlen deionisiertem Wasser, 60 Tlen Titandioxid (Rutiltyp), 60 Tlen Bariumsulfat und 0,2 Tlen Flammruß hergestellt. Die Paste wird mit 181,8 Tlen der 33%igen Bindemittellösung, 18 Tlen eines handelsüblichen Melaminharzes vom Hexamethoxymethylmelamintyp und 12 Tlen deionisiertem Wasser aufgelackt. Der Lack weist einen Festkörpergehalt von ca. 50 %, einen pH-Wert von ca. 9 und eine Auslaufzeit gemäß DIN 53211/20 Grad C von ca 30 Sekunden auf.

(b) Vergleichsbeispiel: Analog wie in (a) angegeben wird eine Pigmentpaste aus 134 Tlen eines 75%igen Bindemittels gemäß Beispiel 1 der AT-PS 328 587 (Komp. A: DCO-Leinöl-Addukt; Komp. B: Polyester aus Triethylenglykol, Phthalsäureanhydrid und Trimethylolpropan; 1 Stunde bei 120 Grad C kondensiert), 88 Tlen Ethylenglykolmonobutylether, 167 Tlen Titandioxid (Rutiltyp), 84 Tlen Bariumsulfat und 0,5 Tlen Flammruß hergestellt. Die Lackpaste wird mit 158 Tlen Harz, 75%ig, 33 Tlen Hexamethoxymethylmelamin, 41 Tlen Ethylenglykolmonobutylether und 209 Tlen deionisiertem Wasser komplettiert. Der Lack weist einen Festkörpergehalt von ca. 55 %, einen pH-Wert von ca. 8 und eine Auslaufzeit gemäß DIN 53 211 von ca. 30 Sekunden auf.

(c) Ergebnisse der lacktechnischen Prüfung: Die Lacke werden mit Druckluftpistole auf nicht vorbehandeltes Stahlblech appliziert und bei den in der nachstehenden Tabelle angegebenen Temperaturen eingebrannt. Die Filme weisen eine Trockenfilmstärke von 25 bis 30 µm auf. Die Ergebnisse sind in der Tabelle zusammengefaßt.

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	Erfg. Bindemittel		Vergleichsbeispiel	
	Einbrennbed. 20 min.	140 C 160 C	140 C 160 C	
	Pendelhärte nach KÖNIG (Sekunden)	130 150	150 160	
	Tiefung nach ERICHSEN (mm)	9 8	3 2	
	Gitterschnitt DIN 53 151	GT 0 GT 0	GT 2 GT 3 - 4	
	Salzprühtest ASTM B 117/64 240 Stunden Ablösung am Kreuz- schnitt in mm	10-15 10	30-40 30-50	
	Tropentest 240 Stunden, 40 Grad C Beurteilung nach DIN 50 017	m0 g0 m0 g0	m4 g2 m2 g2	

Ansprüche

1. Verfahren zur Herstellung wasserverdünnbarer Lackbindemittel auf der Basis von partiellen Kondensationsprodukten einer nach zumindestens teilweiser Neutralisation der Carboxylgruppen wasserlöslichen Maleinatölkomponte und einer Polyhydroxylkomponente, sowie einer Vernetzungskomponente, vorzugsweise einem Aminoharz, dadurch gekennzeichnet, daß man
- (A) 10 bis 90 Gew.-%, vorzugsweise 18 bis 40 Gew.-%, eines oder mehrerer Anlagerungsprodukte von Maleinsäure(anhydrid) an ungesättigte Öle und/oder Fettsäuren, deren Maleinsäure(anhydrid)anteil zwischen 10 und 30 Mol-%, vorzugsweise zwischen 16 und 27 Mol-% liegt und deren Anhydridgruppen mit Wasser und/oder Monoalkoholen aufgeschlossen sind, mit
- (B) 90 bis 10 Gew.-%, vorzugsweise 82 bis 60 Gew.-%, einer oder mehrerer wasserunlöslicher, filmbilden-

der Polyhydroxylverbindungen, die zumindestens 30 % aus vorzugsweise fettsäuremodifizierten Polykondensations-und/oder Polyadditionsprodukten, welche pro 1000 g mindestens 0,5 Mol einer substituierten Harnstoffgruppe (-N-CO-N-), sowie Urethangruppen enthalten und eine Säurezahl von weniger als 5 mg KOH/g, eine Hydroxylzahl von 50 bis 300 mg KOH/g und eine Grenzviskositätszahl von 8 bis 13 ml/g, gemessen in NN-Dimethylformamid (DMF) bei 20 Grad C aufweisen und bis maximal 70 Gew.-% aus Polyhydroxylverbindungen (C), welche vorzugsweise, mit Ausnahme der Anwesenheit von substituierten Harnstoffgruppen der Komponente (B) entsprechen, bestehen, bei 90 bis 150 Grad C bis zu einer Grenzviskositätszahl (DMF/20 Grad C) zwischen 10 und 20 ml/g kondensiert, mit der Maßgabe, daß das Verhältnis der Grenzviskositätszahlen der Polyhydroxylkomponenten und der Polycarboxylkomponenten zwischen 1,4 und 2,7 liegt und das Endprodukt mindestens 0,3 Mol an substituierten Harnstoffgruppen aufweist.

2. Verfahren nach Anspruch 1, dadurch gekennzeichnet, daß man Polycarboxylverbindungen mit einer Grenzviskositätszahl zwischen 4 und 8 ml/g, (DMF/20 Grad C) einsetzt.

3. Verfahren nach den Ansprüchen 1 und 2, dadurch gekennzeichnet, daß man als Polyhydroxylverbindung gegebenenfalls mit Monocarbonsäuren mit 5 bis 20 Kohlenstoffatomen modifizierte Hydroxylgruppen aufweisende Polyesterharze einsetzt.

4. Verfahren nach den Ansprüchen 1 bis 3, dadurch gekennzeichnet, daß man als Polyhydroxylkomponente (B) Polyesterharze einsetzt, die durch Einsatz von sekundären Alkanolaminen und Isocyanatverbindungen Harnstoff-und Urethangruppen aufweisen.

5. Verfahren nach den Ansprüchen 1 bis 3, dadurch gekennzeichnet, daß man als Polyhydroxylkomponente (B) Polymere einsetzt, die durch Umsetzung von Epoxid-Aminverbindungen, Alkanolaminen, gegebenenfalls Polyolen und Polyisocyanatverbindungen erhalten werden.

6. Verfahren nach den Ansprüchen 1 bis 5, dadurch gekennzeichnet, daß als Polyhydroxylkomponente, vorzugsweise als Komponente (C), Copolymerisate aus hydroxylfunktionellen (Meth)acrylmonomeren mit anderen Vinyl-und/oder Vinylidenverbindungen eingesetzt werden.

7. Verwendung der nach den Ansprüchen 1 bis 6 hergestellten Bindemittel in Kombination mit Phenol-und/oder Aminoharzen als Vernetzungskomponente zur Formulierung von wasserverdünnbaren Lacken, insbesondere von Zwischenschichtlacken (Füllern.)

Application No.: 10/565,014
Appeal Brief dated February 22, 2011

Docket No.: 11885-00075-US

EXHIBIT B



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Method to the preparation of water-dilutable lacquer bonding agents

The invention relates to a method to the preparation of water-dilutable lacquer bonding agents on the basis of combinations of a water-soluble Maleinatölkomponte and one the bottom usual conditions water-insoluble, modified groups of urea and urethane groups exhibiting polyhydroxyl compound. The products show a substantially improved adhesive strength, both opposite the ground, opposite the products of the state of the art therefore a metallic substrate or a primer, and in relation to subsequent layers.

From at-PS 328,587 a method is known to the preparation of aqueous, furnace-drying bonding agents, with which an water-insoluble film-formed polyhydroxyl compound (PH) and a film-formed Polycarboxylverbindung (PC) become mixed or partial condensed and subsequent salt formation bottom with organic bases into the water-soluble state converted. The products become processed in combination with cross-linking components, like Aminoharzen. Although these bonding agents show excellent application technology properties because of absence of the anomalous viscosity behavior arising with solvent-poor systems on ammonia or amine salt basis and result in coats with excellent properties, difficulties arise in particular during the intermediate layer adhesion with the use of this type of bonding agent for water-dilutable primers and with use as bonding agents for filler materials.

As filler as well known becomes referred on a primer, which became obtained by Electroabscheidung if necessary, the applied layer. It serves before the job of the finish coating as intermediate layer, by which error in the primer balanced is to become to be able and the basis corresponding for the subsequent finish coating represent. This structure of lacquer becomes in particular used into the automotive industry with the coating of passenger cars. It is clearer that this intermediate layer a balanced characteristic characteristic concerning adhesion, hardness, Schleifbarkeit, elasticity and. A. to exhibit must.

It was now found that these properties are more achievable with water-dilutable lacquer bonding agents on the Basis of mixtures or partial condensation products of water-soluble Polycarboxylverbindungen and water-insoluble polyhydroxyl compounds, if a Maleinatölkomponte becomes at least proportionate with urea and urethane groups an exhibiting polyhydroxyl compound combined.

The instant invention concerns accordingly a method to the preparation of water-dilutable lacquer bonding agents on the basis of partial condensation products of a Maleinatölkomponte water-soluble after zumindestens partial neutralization of the carboxyl groups and a Polyhydroxylkomponente, as well as a cross-linking component, preferably a Aminoharz, which by the fact characterized is that one

(A) 10 to 90 Gew. - %, preferably 18 to 40 Gew. - %, or several accumulation products of maleic acid (anhydride) at unsaturated oils and/or fatty acids, whose maleic acid (anhydride) is appropriate for portion between 10 and 30 mol %, preferably between 16 and 27 mol % and their anhydride groups with water and/or are unlocked to monoalcohols, also

(B) 90 to 10 Gew. - %, preferably 82 to 60 Gew. - %, or several water-insoluble, film-formed polyhydroxyl compounds, which zumindestens 30% from preferably fatty acid-modified polycondensation and/or polyaddition products, which per 1000 g at least 0.5 mole of a substituted group of urea (- N-CO -N), as well as urethane groups contained and an acid value of less than 5 mg KOH/g, an hydroxyl number of 50 to 300 mg KOH/g and a Grenzviskositätszahl from 8 to 13 m/l/g, measured in NN-dimethylformamide (DMF) with 20 degrees C exhibit, and to maximum 70 Gew. - % of polyhydroxyl compounds (C), which correspond preferably, with exception to the presence of substituted groups of urea of the component (B), consist, with 90 to 150 degrees C up to a Grenzviskositätszahl (DMF/20 degrees C) between 10 and 20 m/l/g condensed, under the condition that the ratio of the Grenzviskositätszahlen of the Polyhydroxylkomponenten and der Polycarboxylkomponenten between 1,4 and 2,7 is and the final product at least 0.3 mole because of substituted groups of urea exhibits.

The invention relates to further the use of the so prepared synthetic resin bonding agents for the formulation of water-dilutable paints, in particular of primers and fillers (primer Surfacers).

The film-formed Polycarboxylverbindung water-soluble after neutralization (component A) can become as macromolecular emulsifier construed, which is involved after the crosslinking of the coat as integrating component at the structure of film. Suitable starting materials for the film-formed Polycarboxylverbindungen, which exhibit an acid value of 50 to 280 mg KOH/g, are for the instant invention addition products of maleic acid (anhydride) to unsaturated fatty acids, as they occur in the natural oils and their derivatives, as well as the analogous addition products to such oils. The fatty acids exhibit an iodine value of at least 110 and preferably contain to the majority isolated double bonds. Likewise also the commercial low molecular liquid serving (CO) - polymere, above all polybutadienes can be consulted as addition partners.

The anhydride groupings of these addition products are split up for the invention process into known manner either by waters or monohydric alcohols. The used Polycarboxylverbindungen preferably exhibits a Grenzviskositätszahl between 4 and 8 m/l/g (DMF, 20 degrees C).

As polyhydroxyl compounds (component (B) and (C)) water-insoluble, film forming polymers used, become which are characterized by the practical complete absence of free carboxyl groups, i.e. that it an acid value of less than 5 mg KOH/g exhibit. Their hydroxyl number lies between 50 and 300 mg KOH/g.

The polyhydroxyl compounds of the component (B) and (C) become z. B. in known manner by condensation of polyols, like mono ethylen glycol, Diäthylenglykol, tri ethylen glycol, glycerol, trimethylolpropane, pentaerythritol, with polycarboxylic acids or their anhydrides such as o-phthalic acid, terephthalic acid, trimellitic acid, succinic acid, adipic acid, sebacic acid etc., if necessary bottom proportionate use of monocarboxylic acids with 5 to 20 carbon atoms, prepared, whereby the polyols in the stoichiometric excess become used.

As essential groups the polyhydroxyl compounds contain at least 0.5 mole of a substituted group of urea, which by the formula of the component (B) per 1000 g - N-CO-N shown will can. Besides this component exhibits urethane groups.

The groups of urea become obtained by proportionate use of secondary alkanolamines, like Dialkanolaminen and Alkanolalkylaminen, and subsequent conversion of the secondary amino group with mono, the or polyisocyanates. The required urethane groups develop with the proportionate reaction of the isocyanate compounds with a part of the hydroxyl groups of the PHV. By these reactions becomes also for this component required the Grenzviskositätszahl from 8 to 13 m/l/g (DMF/20 degrees C) achieved.

In a particular embodiment (B) suitable polymers by common reaction of epoxy amine adduct connections, alkanolamines, if necessary polyols and polyisocyanate compounds prepared become as component. Mono epoxy connections, and the commercial Glycidylester of cook-acidic can, e.g. as epoxy compounds both, the alpha, alpha-Dimethyl-C9-C11-monocarbonsäuren, and Diglycidylverbindungen, as the epoxy resins on basis of diols or bisphenols become, used. The achievement of the necessary hydroxyl number the epoxy compounds become preferably reacted with Dialkanolaminen. As polyols also corresponding prepolymeres can become from diisocyanates with diols, polyols or alkanolamines used.

⌂ top

The alkanolamines and/or. Polyols and the epoxy resin amine adducts become thereby in a ratio of 70: 30 to 30: 70 used. By the reaction with the polyisocyanate the desired Grenzviskositätszahl becomes achieved. As polyisocyanates the conventional diisocyanates or prepolymers with free NCO groups with polyols become, z. B. Trimethylolpropane used.

One keeps also suitable polyhydroxyl compounds, which as component (C) used become preferably, äthylenisch by copolymerization alpha, beta - unsaturated compounds, the free hydroxyl groups inertial, as ethylen glycol mono (meth) acrylic acid ester, with other copolymer-ionable vinyl compounds, as esters of the acryl and/or. Methacrylic acid of monohydric alcohols, amides of the acryl and/or. Methacrylic acid, styrene, vinyl toluene and other monomers, so far it no carboxyl groups inertial. The copolymers know also small amounts of formaldehyde condensates of melamine, urea, Benzoguanamin, etc. in-condensed contain.

For oxidative air-drying bonding agents is, like the person skilled in the art known is, a sufficient portion of unsaturated fatty acid residues in the system necessary. For prepared according to invention bonding agents, which for air-drying paints used becomes, this portion is not to lie in the pH component bottom 30% (Öllänge).

For the preparation according to invention of the bonding agents become the components in a ratio from 10 to 90 Gew. - % Polycarboxylkomponente (A): 90 to 10 Gew. - % Polyhydroxylkomponente (B + C) with 90 to 150 degrees C condensed. Preferably become the components in a ratio from 18 to 40 Gew. - % (A): 82 to 60 Gew. - % (B) used. The ratio of the Grenzviskositätszahlen of the starting components is favourable-proves to a quotient PH/PC between 1,4 and 2,7 to correspond. The final products must contain at least 0.3 mole of the substituted groups of urea per 1000 g.

The partial condensation becomes up to a Grenzviskositätszahl from 10 to 20, preferably from 14 to 18 mI/g (measured in DMF, 20 degrees C) guided. The condensation reaction becomes followed on the basis the acid value, the viscosity and the water dilutibility of the reaction product, whereby in the course of the reaction a decrease of the acid value over up to 20 units made.

Those racks of combination products are as far as possible dilutable with water according to invention, whereby the water-insoluble component becomes PH by the water-soluble macromolecular component PC in the solution stabilized. In some particularly preferred cases the dispersions or emulsions generated by water additive are in the processing state optical clear and cloudy itself only with much stronger dilution, which is however unnecessary for the processing purpose. It is in addition an essential flagstone of the coating agents according to invention that they result in a clear film after evaporating the water and eventual present auxiliary solvents.

Prepared the according to invention coating agents can become as clear coat or in pigmented form applied. As cross-linking component water-tolerant Aminoharze or phenolic resins becomes used. Preferably Melamin Formaldehydcondensate of the type of the Hexamethoxymethylmelamins become used. For the pigmentation are suitable the conventional pigments, dyes and fillers, for example titanium dioxide, iron oxide, soot, silicate pigments, Lithopone, Phthalocyaninfarbstoffe and. A. The coating agents can contain also Hilfstoffe for pigment wetting, against Ausschwimmerscheinungen, foam formation, skin formation or surface disturbances. Conventional additives are also Silikone to the increase of the scratch resistance or to the achievement of special surface effects.

The subsequent examples describe the invention, without limiting it their scope. All indications in parts or percents relate indicated is, sofern nothing else, on units of weight.

Example 1:

PH component:

In a suitable reaction vessel 105 g (1 mole) become by portion Diethanolamin on 80 degrees C heated and with 250 g (1 mole) commercial Glycidylestergemini from alpha, alpha-Dimethyl-C9-C11-mono-carbonsäuren offset. The temperature becomes maintained up to the complete conversion of the Oxirangruppen.

532 g (1.5 mole) of this reaction product, 53 g (0.5 mole) Diethanolamin and 382 g methyl ethyl ketone become heated on 75 degrees C. Then 300 g Toluylendiisocyanat uniform are course-dripped and the temperature maintained, until the NCO value sank on 0 and a Grenzviskositätszahl (DMF, 20 degrees C) between 10,5 and 11 mI/g achieved is. If the Grenzviskositätszahl is with a NCO value of 0 of bottom 10.5 mI/g, the approach with other Toluylendiisocyanat in small portions becomes offset, until the desired value is achieved.

Subsequent one becomes the approach with 226 g Methoxypropoxypropanol diluted and the methyl ethyl ketone in the vacuum withdrawn, until a solid content is from 80% achieved. The product exhibits an hydroxyl number of 130 mg KOH/g.

PC component:

165 g dehydratisiertes castor oil and 135 g linseed oil are umgeestert common 1 hour with 250 degrees C and then with 100 g maleic anhydride with 200 degrees C so long reacted complete bonded practical to the maleic anhydride are. After cool ones on 90 degrees C a mixture is unlocked to deionisiertem water and 3 g triethylamine added and the anhydride groups by 30 g with 95 to 100 degrees C.

Then the approach with Methoxypropoxypropanol becomes on a solid content of 80% diluted. The product exhibits an acid value of approximately 220 mg KOH/g.

Combination according to invention:

1130 g (904 g Festharz) of the pH component and 283 g (226 g Festharz) of the PC component become so long condensed, until a Grenzviskositätszahl of 16,5 is mI/g (DMF, with 110 degrees C, 20 degrees C) achieved. Subsequent one becomes the approach with 56 g dimethylethanolamine partial neutralized and with deionized water on a solid content of 33% diluted.

The product exhibits a portion of substituted Harstoffgruppen of 0,5 Mol/1000 g Festharz and results in after Abdunsten of the volatile portions a clear film.

Lacquer-technical examination:

(A) In a Perl mill a pigment paste becomes from 127,3 Tlen of the described above 33%igen bindemittellösung, 27 Tlen deionized water, 60 Tlen titanium dioxide (type of rutile), 60 Tlen barium sulfate and 0.2 Tlen flaming soot prepared in known manner. The paste is aufgelackt with 181,8 Tlen of the 33%igen binder solution, 18 Tlen of a commercial melamine resin by the Hexamethoxymethylmelamintyp and 12 Tlen deionized water. The paint points a Festkörergehalt from approx. 50%, a pH value of approx. 9 and a paper-eject time in accordance with DIN 53211/20 degrees C of approx. 30 seconds up.

(B) Comparison example: Analogous as in (A) indicated becomes a pigment paste from 134 Tlen of a 75%igen of bonding agent in accordance with example 1 at-PS 328,587 (complete ones. A: DCO linseed oiladduct; Complete one. B: Polyester from triethylene glycol, Phthalsäureanhydrid and trimethylolpropane; 1 hour with 120 degrees C condensed), 88 Tlen Ethylenglykolmonobutylether, 167 Tlen titanium dioxide (type of rutile), 84 Tlen barium sulfate and 0.5 Tlen flaming soot prepared. The lacquer paste is completed with 158 Tlen resin, 75%ig, 33 Tlen Hexamethoxymethylmelamin, 41 Tlen Ethylenglykolmonobutylether and 209 Tlen deionisiertem water. The paint points a solid content from approx. 55%, a pH value of approx. 8 and a paper-eject time in accordance with DIN 53,211 of approx. 30 seconds up.

(C) Suppl. bites of the lacquer-technical examination: The paints become applied with compressed air pistol on not pretreated steel sheet and with the temperatures baked indicated in the appended table. The films exhibit a drying-film-strong from 25 to 30 mu m. The results are in the table summarized.
EMI11.1

⌂ top

Application No.: 10/565,014
Appeal Brief dated February 22, 2011

Docket No.: 11885-00075-US

EXHIBIT C



US006114434A

United States Patent [19]**Tuemmler et al.**[11] **Patent Number:** **6,114,434**[45] **Date of Patent:** **Sep. 5, 2000**[54] **WATER-DILUTABLE RESINS, PROCESS FOR PREPARING THEM, AND THEIR USE**[75] Inventors: **Peter Tuemmler; Gerald Hobisch,**
both of Graz, Austria; **Hellmuth Kasch,**
Ludwigshafen, Germany[73] Assignee: **Vianova Resins AG, Werndorf, Austria**[21] Appl. No.: **09/166,524**[22] Filed: **Oct. 6, 1998**[30] **Foreign Application Priority Data**

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[51] **Int. Cl.⁷** **C09D 161/02; C09D 161/20**[52] **U.S. Cl.** **524/512; 524/502; 524/539;**
524/542; 524/592; 524/598; 525/153; 525/163;
525/437; 525/441; 525/443; 525/471; 525/517.5;
525/518; 525/519; 525/521[58] **Field of Search** **525/153, 163,**
525/437, 441, 443, 471, 517.5, 518, 519,
521; 524/512, 539, 542, 592, 598, 502[56] **References Cited****U.S. PATENT DOCUMENTS**3,796,770 3/1974 Daimler et al. .
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728 079 7/1995 United Kingdom .*Primary Examiner*—Patricia A. Short
Attorney, Agent, or Firm—Foley & Lardner[57] **ABSTRACT**

Resins AB which are dilutable in water following neutralization and have an acid number of from 25 to 160 mg/g, obtainable by reacting mass fractions, based in each case on the sum of the masses of the solids in the reaction mixture, of A from 30 to 90% of at least one acid-functional polymer selected from polyesters, dimerized and oligomerized unsaturated aliphatic carboxylic acids and polymers of olefinically unsaturated monomers, each having an acid number of from 30 to 240 mg/g, and B from 10 to 70% of at least one water-insoluble aldehyde resin or ketone resin obtainable by condensing ketones, ketones together with aldehydes, ketones with urea or aldehydes with urea, having a hydroxyl number from 20 to 300 mg/g, a softening point of from 60 to 140° C. and a number-average molar mass of from 500 to 3000 g/mol.

15 Claims, No Drawings

WATER-DILUTABLE RESINS, PROCESS FOR PREPARING THEM, AND THEIR USE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates to resins which are suitable for use as pigment paste resins and are dilutable in water following neutralization. The resins are obtainable by reacting hard resins based on aldehydes or ketones with a binderlike polycarboxyl component which is dilutable in water following neutralization.

2. Description of Related Art

Hard resins based on aldehydes or ketones, generally referred to in simplified form in the art as aldehyde resins or ketone resins respectively, have been known for a long time. Such resins are formed when ketones are condensed under the catalysis of alkali; especially notable is the resin derived from cyclohexanone. Such resins are described, i. a., in "The Chemistry of Synthetic Resins" by Carleton Ellis, New York 1935, page 557 et seq. Other solid and fusible resins are produced from the cocondensation of, e.g., cyclohexanone and formaldehyde with mild alkali (*ibid.*, page 559). These hard resins are important base materials for nitrocellulose lacquers and alkyd resin varnishes because of their specific coatings properties, such as light color, resistance to hydrolysis and yellowing, compatibility with other coatings binders, and excellent solubility in polar organic solvents. In specific applications too, for instance as a base resin for solvent borne universal pigment pastes, they have in recent years acquired great practical significance.

In view of the demand for environmentally friendly coating materials, however, aldehyde and ketone resins have a substantial disadvantage from the point of view of paint manufacturers and users: in particular they are insoluble in water.

Only a few attempts to prepare stable aqueous dispersions on the basis of such water-insoluble aldehyde and ketone resins are known from the patent literature and are described, for example, in DE-A 34 06 474, where co-components include a protective colloid and specific copolymers.

SUMMARY OF THE INVENTION

It was the object of the present invention to provide water-dilutable resins based on water-insoluble aldehyde or ketone resins, and to thereby extend the possibilities for using these resins as the binder component, and especially as a pigment paste resin, for water-dilutable coating materials, without adversely effecting the properties of the underlying coating system. Consequently, the invention permits the preparation of low-solvent pigment formulations suitable for general employment.

In accordance with these objects, there has been provided a resin AB which is dilutable in water following neutralization and has an acid number of from 25 to 160 mg/g, obtained by reacting in a reaction mixture mass fractions, based in each case on the sum of the masses of the solids in the reaction mixture, of:

A from 30 to 95%, preferably from 35 to 92%, and especially preferred from 40 to 90%, of at least one acid-functional component selected from one or more polyesters, one or more dimerized and oligomerized unsaturated aliphatic carboxylic acids, and one or more polymers of olefinically unsaturated monomers, each having an acid number of from 30 to 270 mg/g, preferably

from 60 to 260 mg/g, and especially preferred from 90 to 250 mg/g, and

B from 5 to 70%, preferably from 8 to 65%, and especially preferred from 10 to 60%, of at least one water-insoluble aldehyde resin or ketone resin obtained by condensing one or more of ketones, one or more ketones together with one or more aldehydes, one or more ketones with a urea, or one or more aldehydes with a urea; each resin having a hydroxyl number from 10 to 350, preferably from 15 to 330, and especially preferred from 20 to 300 mg/g, a softening point of from 60 to 140° C., and a number-average molar mass of from 300 to 5,000 g/mol, preferably from 350 to 4,000 g/mol, and especially preferred from 500 to 3,000 g/mol,

the sum of the mass fractions of A and B in the reaction mixture being 100%.

Further objects feature, and advantages of the present invention will become apparent from the detailed description that follows.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

It has been found that it is possible at least partially to condense aldehyde and ketone resins with certain binderlike polymers which are dilutable in water following neutralization. The binder-like polymers can be acrylate copolymers; polyesters having a high proportion of carboxyl groups; or carboxyl-containing components obtainable by dimerization or oligomerization of unsaturated aliphatic carboxylic acids. The coating binders are readily dilutable with water and are stable on storage in the form of an aqueous dispersion. Acid-functional polymers (polycarboxyl components) and acrylate copolymer types suitable for the present invention are described, for example, in AT 396 244 B1 (EP-A 0 496 079) and in AT 388 921 (EP-A 0 295 403), all of which are herein incorporated by reference in their entirety.

The invention provides resins AB which are dilutable in water following neutralization and have an acid number of from 15 to 180, preferably from 20 to 170, and especially preferred from 25 to 160 mg/g, obtainable in a preferred embodiment by reacting mass fractions, based in each case on the sum of the masses of the solids in the reaction mixture, of

A from 30 to 90% of at least one acid-functional polymer selected from polyesters, dimerized and oligomerized unsaturated aliphatic carboxylic acids and polymers of olefinically unsaturated monomers, each having an acid number of from 30 to 240 mg/g, and

B from 10 to 70% of at least one water-insoluble aldehyde resin or ketone resin obtainable by condensing ketones, ketones together with aldehydes, ketones with urea or aldehydes with urea, having a hydroxyl number from 20 to 300 mg/g, a softening point of from 60 to 140° C. and a number-average molar mass of from 500 to 3000 g/mol, the sum of the mass fractions of A and B within the reaction mixture always being 100%.

The acid number is defined in accordance with DIN 53 402 as the quotient of the mass m_{KOH} of potassium hydroxide required to neutralize a test sample and the mass m_B of this sample (mass of the solids in the sample in the case of solutions or dispersions); its customary unit is mg/g.

Any component A meeting the above definition can be used. Suitable components A include acid-functional copolymers of olefinically unsaturated monomers having an acid number of the copolymer of preferably from 30 to 240 mg/g.

Copolymers of this kind are preferably prepared by ensuring that at least one of the olefinically unsaturated monomers

employed, namely A1, carries at least one acid group, preferably a carboxyl group. One or more of these monomers A1 are copolymerized with one or more monomers A2 which are free from acid groups. It is also possible to vary the composition of the monomer mixture during the polymerization. The desired acid number can easily be established by an appropriate choice of the nature and amount of the monomers.

As acid-functional monomers A1 it is preferred to employ α,β -unsaturated carboxylic acids having 3 to 13 carbon atoms or monoalkyl esters of α,β -unsaturated aliphatic dicarboxylic acids having 1 to 20 carbon atoms in the alkyl radical. It is also useful to employ olefinically unsaturated aliphatic dicarboxylic acids such as maleic, itaconic, mesaconic, citraconic, and dihydromuconic acid in unesterified form. Suitable α,β -unsaturated carboxylic acids include acrylic and methacrylic acid, crotonic and isocrotonic acid, vinylacetic acid, 3-propylacrylic acid, and 2-octenoic acid. Suitable monoalkyl esters of α,β -unsaturated dicarboxylic acids include monomethyl, monoethyl, monopropyl, and monobutyl esters, such as monomethyl maleate, monoethyl fumarate, monobutyl mesaconate and monopropyl trans-3-hexenedioate. These acid-functional monomers are preferably employed in mass fractions of from 5 to 40%, preferably from 7 to 35%, and especially preferred from 10 to 33%, based on the mass of the monomer mixture.

The monomers A2 can be any monomer or mixture of monomers, which are free from acid groups. They can be selected from alkyl esters of monobasic α,β -unsaturated aliphatic carboxylic acids having 3 to 7 carbon atoms in the acid component and 1 to 20, preferably 1 to 12, carbon atoms in the alkyl component; the dialkyl esters of α,β -unsaturated aliphatic dicarboxylic acids having 4 to 8 carbon atoms in the acid component and 1 to 20, preferably 1 to 12, carbon atoms in the alkyl component; the nitriles of these acids; the hydroxyalkyl esters of the abovementioned monobasic α,β -unsaturated aliphatic carboxylic acids having 3 to 7 carbon atoms in the acid component and 2 to 20 carbon atoms in the hydroxyalkyl component, including oligo-oxyalkylene glycol monoesters having a number-average degree of polymerization of from 2 to 50 whose alkylene groups are selected from the ethylene and 1,2-propylene groups and mixtures thereof; vinylaromatic compounds, such as styrene and vinyltoluene; and the vinyl esters of saturated aliphatic linear and branched monocarboxylic acids having 2 to 20 carbon atoms, such as vinyl acetate, vinyl propionate; and vinyl Versatate, which is a trade name for α,α -dialkyl substituted aliphatic acids. The monomers A2 are generally employed in mass fractions of from 60 to 95%, preferably from 65 to 93%, and especially preferred from 67 to 90%, based on the mass of the monomer mixture. In a preferred embodiment, A comprises a copolymer formed from a monomer mixture comprising mass fractions of

A1 from 10 to 33% of one or more monomers selected from the group consisting of an α,β -unsaturated aliphatic carboxylic acid having 3 to 13 carbon atoms, and a monoalkyl ester of an α,β -unsaturated aliphatic dicarboxylic acid having 1 to 20 carbon atoms in the alkyl radical,

A2 from 67 to 90% of one or more olefinically unsaturated monomers which are free of acid groups, selected from the group consisting of esters of acrylic and methacrylic acid with aliphatic alcohols having 1 to 12 carbon atoms in the alkyl radical, styrene, vinyl toluene, acrylonitrile, methacrylonitrile, hydroxyalkyl (meth)acrylates having 2

to 20 carbon atoms in the alkyl radical, and dialkyl esters of α,β -unsaturated aliphatic dicarboxylic acids having 1 to 20 carbon atoms in the alkyl radical, and

A3 from 0 to 50% of one or more mono- or polyunsaturated fatty acids having 14 to 30 carbon atoms, or their esters, the sum of the mass fractions of A1, A2, and A3 in the monomer mixture being 100%.

If desired it is also possible as optional further monomers A3 to employ mono- or polyunsaturated fatty acids having 14 to 30 carbon atoms or their esters with, for example, aliphatic alcohols having 1 to 20 carbon atoms in the alkyl group. Examples of suitable monomers A3 include oleic, linoleic, linolenic, and ricinonic acid and also mixtures of such acids, such as safflower oil fatty acid, soya oil fatty acid, linseed oil fatty acid, cotton seed oil fatty acid, sunflower oil fatty acid and tall oil fatty acid, and their esters. The mass fraction of these monomers A3 in the monomer mixture composed of A1, A2 and A3 is generally from 0 to 50%, preferably from 2 to 48%, and especially from 5 to 45%.

The monomer mixture is polymerized in accordance with known methods, preferably by free-radical initiated polymerization. Initiators which can be employed include the known peroxides, peracids and derivatives thereof, azo compounds, and the oxidant/reductant couples known as redox catalysts, alone or together with salts of transition metals such as iron, cerium or manganese. The polymerization can be carried out in solution, in emulsion or in bulk.

Component A can also be a carboxyl group-containing polyester having an acid number of from 30 to 240 mg/g, obtainable by condensation of

A4 one or more divalent aliphatic linear, branched or cyclic alcohols having 2 to 20 carbon atoms and

A5 one or more dibasic aliphatic or aromatic carboxylic acids.

A fraction of the amount of substance of up to 10% of component A4 can be replaced by aliphatic linear, branched or cyclic alcohols with three or more hydroxyl groups and having from three to 20 carbon atoms. Similarly, a fraction of the amount of substance of up to 10% of component A5 can be replaced by an aliphatic or aromatic carboxylic acid with three or more carboxyl groups. The polyesters can also be condensed with the concomitant use of mass fractions of up to 15% of hydroxy carboxylic acids A6 each of which has at least one hydroxyl group and at least one carboxyl group.

Examples of compounds which can be employed as alcohols A4 include ethylene glycol, 1,2- and 1,3-propylene glycol, 1,4-butanediol, neopentyl glycol, 1,6-hexanediol, 1,2- and 1,4-dihydroxycyclohexane, 3,4-diethyl-3,4-hexanediol and 1,4-bis(hydroxymethyl)-cyclohexane, each individually or in a mixture. Particular preference is given to glycol, neopentyl glycol, and 1,2-propylene glycol.

As dibasic carboxylic acids A5 it is preferred to employ adipic, succinic, sebacic, cyclohexane dicarboxylic, phthalic, isophthalic, terephthalic, sulphonyldibenzoic, diphenyl ether dicarboxylic and the isomeric naphthalenedicarboxylic acids and also dimeric fatty acids obtained by catalytic dimerization of unsaturated fatty acids (e.g., tall oil fatty acid) in the form of a mixture of acyclic and cyclic dicarboxylic acids. It is also useful to employ mono- or polyunsaturated aliphatic dicarboxylic acids, such as maleic, fumaric, itaconic, citraconic and mesaconic or sorbic acid. Particular preference is given to adipic acid, maleic acid and the isomeric phthalic acids, in each case individually or in a mixture.

Suitable hydroxy carboxylic acids A6 include lactic, dimethylolpropionic, tartaric, uvic, glycolic,

dihydroxysuccinic, and malic acid. This component as well may comprise mixtures of two or more of the appropriate substances.

The polyesters can be obtained in a known manner by polycondensation of the starting materials A4 to A6 or their ester-forming derivatives (such as methyl esters or halides or anhydrides of the acids, or acetates of the alcohols), in bulk or in solution. In order to accelerate the reaction it is possible to employ the known transesterification catalysts.

Dimerized and oligomerized unsaturated aliphatic carboxylic acids are likewise suitable as component A. They can be obtained by dimerization or oligomerization of mono- or polyunsaturated fatty acids having 6 to 30 carbon atoms. Preference is given to mixtures of linear, branched and cyclic dimers and trimers of unsaturated fatty acids having 16 to 24 carbon atoms, especially 18 carbon atoms, which mixtures are obtained by catalysis with metal oxides.

Resins suitable as component B are those water-insoluble aldehyde and ketone resins obtainable by condensation of ketones, ketones together with aldehydes, ketones with urea, or aldehydes with urea, having a hydroxyl number of from 20 to 300 mg/g, a softening point of from 60 to 140° C. and a number-average molar mass of from 500 to 3000 g/mol. The resins of this invention are customarily prepared by alkali-catalysed condensation. Suitable preparation processes are described in DRP 337 993, DRP 357 091, DRP 511 092, DE 0 749 836, DRP 339 107, and DE-A 28 31 613, all of which are incorporated by reference in their entirety.

Any such resins B or mixtures of such resins can be used. Suitable ketone resins are derived from cycloaliphatic ketones, such as cyclohexanone or its derivatives such as methylcyclohexanone and tert.-butyl cyclohexanone. The resins can be obtained from these ketones or mixtures thereof by known processes. Further suitable resins are obtained by condensing ketones in the presence of urea, substituted ureas or derivatives thereof, such as 2-imidazolidinone, for example. Likewise suitable are condensation products of ketones and aldehydes, preferably cycloaliphatic ketones and formaldehyde or its oligomers, likewise optionally in the presence of urea or its derivatives. Especially preferred are resins obtained by condensation of cyclohexanone, alone or in combination with other ketones or aldehydes. The resins B do not include the condensation products of urea, or similar compounds, like melamine, with formaldehyde which are water-dilutable resins usually referred to as aminoplasts.

The resins AB of the invention can be obtained as desired, and, for example, are obtainable by reacting the components A and B at elevated temperature, preferably at from 100 to 220° C., preferably in the melt without addition of a solvent, although it is also possible if desired to add a solvent which is inert under the reaction conditions, in mass fractions of from 1 up to 20%, based on the sum of the masses of components A and B and of the solvent. Reaction is continued until the acid number of the condensation product of A and B has reached a level of from 25 to 160 mg/g. During the condensation reaction, small amounts of water are formed which escape at the reaction temperature. The water can also be removed, preferably, by azeotropic distillation, employing a solvent which is immiscible with water and forms an azeotrope with water.

The resins AB prepared in this way can be neutralized—directly or following the addition of small amounts of a water-dilutable solvent—with, for example, aqueous alkali, preferably aqueous ammonia solutions or amines. The amount of alkali is preferably chosen such that at least half of the acid groups of the resin are neutralized. However,

neutralization is preferably complete. Water can subsequently added for dilution to a mass fraction of solids in the resulting solution of preferably from 20 to 60%, with particular preference from 30 to 50%. It is also possible to establish the concentration of the neutralizing agent such that dilution and neutralization are performed simultaneously. This gives an aqueous solution or dispersion of the neutralized resin.

The resins AB prepared in accordance with the invention are dilutable in water following the neutralization step. They can be used, for example, to prepare water-dilutable coating compositions. They are especially suitable as paste resins for preparing low-solvent and solvent-free pigment pastes. They feature a high pigment binding capacity, are stable on storage, and undergo little or no change in viscosity in the course of their storage in the pigment pastes produced from them. The amount of pigment that can be incorporated into these resins ranges from about 30 g to about 750 g of pigment per 100 g of resin AB, more typical from about 40 to about 600 g of pigment, and usually from about 50 to about 500 g of pigment. Before addition of pigments, minor amounts, i. e. between 0.5 and 10 g, of additives are usually added to the resin AB. These additives include, inter alia, wetting agents that enhance the interaction, or lower the surface tension, between pigment and resin, antifoaming agents that suppress the propensity to develop foam or bubbles due to enclosed air, anti-skinning agents that suppress the formation of a skin on the surface of air-drying binders like alkyds, rheology modifiers that impart shear thinning or shear thickening properties, flow enhancers that reduce the viscosity, or thickening agents that increase the viscosity. These pigment pastes are easy to incorporate into aqueous binders. Relative to coating materials that are pigmented directly, no adverse effect on the coatings properties is in evidence.

EXAMPLES

The examples which follow illustrate the invention without restricting its scope.

In the examples below, as in the preceding text, all figures with the unit “%” are mass fractions unless stated otherwise. Mass fraction w_z means the ratio of the mass m_z of any ingredient Z in a mixture, and the mass m of that mixture: $w_z = m_z/m$. Parts are always by mass. Concentration figures in % are mass fractions of the dissolved substance in the solution.

The intrinsic viscosity specified in the examples and formerly thus designated, called Staudinger index J_g according to DIN 1342, part 2.4, is the limiting value of the Staudinger function J , at decreasing concentration and shear stress, where J_r is the relative viscosity change $\eta_r - 1 = (\eta - \eta_s)/\eta_s$ related to the mass concentration $\beta_B = m_B/V$ of the dissolved substance B (having the mass m_B of the substance in the volume V of the solution), in other words $J_r = (\eta_r - 1)/\beta_B$. Here, η denotes the viscosity of the test solution and η_s the viscosity of the pure solvent. The unit commonly used for J is dl/g.

1 Preparing the copolymers (1) to (4) and the polyesters (5) and (6)

1.1 Preparing the copolymer (1)

41 parts of linseed oil fatty acid and 5 parts of xylene were heated to 135–140° C. A mixture of 32 parts of isobutyl methacrylate, 6 parts of vinyl toluene, and 21 parts of methacrylic acid together with 6 parts of tert.-butyl perbenzoate, 1 part of dibenzoyl peroxide (50% on dicyclohexyl phthalate as support), and 5 parts of xylene was added simultaneously at this temperature at a uniform rate over the

course of from 6 to 8 hours. Following the end of the addition the reaction temperature was maintained until a residue determination indicated a conversion to polymer of at least 95%. The copolymer had an acid number of 209 mg/g and a Staudinger index (in dimethylformamide as solvent) of 5.5 dl/g.

mixture was adjusted with ethylene glycol monobutyl ether to a mass fraction of solids of 87% and was emulsified at 50° C. with dilute aqueous ammonia solution. The amount of ammonia and water was chosen so as to give an emulsion pH of from 8.2 to 8.4 and a mass fraction of solids of 40%. The resins solutions were milky to transparent liquids.

TABLE 2

Example	2.1	2.2	2.3	2.4	2.5	2.6	2.7
Pigment paste resin	PR1	PR2	PR3	PR4	PR5	PR6	PR7
Component (A)	60(1)	40(2)	80(3)	90(4)	50(2)	70(3)	70(1)
Component (B)	40(B3)	60(B2)	20(B1)	10(B3)	50(B1)	30(B2)	30(B1)
Acid number in mg/g	82	41	110	95	35	74	103

(all figures are mass fractions of the components in the solid)

(B1): @Laropal A81: Aldehyde resin (BASF)

(B2): @Laropal A101: Aldehyde-urea resin (BASF)

(B3): @Laropal K80: Ketone resin (BASF)

1.2 Preparing the copolymers (2) to (4)

The copolymers were prepared conventionally by solution polymerization in isopropanol, corresponding to a calculated mass fraction of solids of 50%. The proportions and characteristic data are summarized in Table 1.

TABLE 1

		Component			
		(1)	(2)	(3)	(4)
(A2)	Ethyl acrylate	—	—	—	25
	Butyl acrylate	—	—	—	30
	2-Ethylhexyl acrylate	—	25	30	—
	Methyl methacrylate	—	—	—	30
	Isobutyl methacrylate	32	18	27	—
	Styrene	—	26	18.5	—
	Vinyltoluene	6	—	—	—
(A1)	Acrylic acid	—	31	—	15
	Methacrylic acid	21	—	24.5	—
(A3)	Linseed oil fatty acid	41	—	—	—
	Acid number in mg/g	209	241	160	117

1.3 Preparing the polyesters (5) and (6)

A polyester (5) having an acid number of 192 mg/g was prepared by melt polycondensation of butanediol and adipic acid.

A polyester (6) having an acid number of 217 mg/g was prepared by melt polycondensation of neopentyl glycol and a mixture of equal amounts of substance of phthalic anhydride and maleic anhydride and a mass fraction of 5% of dimethylol propionic acid in the mixture of starting materials.

The numbers indicated for the educts (reactants) employed are mass fractions in %, in each case adding up to 100%.

2 Preparing the pigment paste resins PR1 to PR10

EXAMPLES 2.1 TO 2.7

Components (A) and (B) in the proportions shown in Table 2 were charged to an appropriate reaction vessel. The reaction mixture was gradually brought with stirring to a circulation temperature of 200° C. and was maintained at this temperature until the stated acid number had been reached. Following removal of the solvent, the reaction

EXAMPLES 2.8 TO 2.10

In similar manner, a pigment paste resin PR8 having an acid number of 52 mg/g was prepared by condensing 45 parts of the polyester (5) and 55 parts of a resin composed of aliphatic aldehydes and urea, having a softening point of from 80 to 90° C. and an acid number of about 1.5 mg/g (@Laropal A81), and a pigment paste resin PR9 having an acid number of 68 mg/g was prepared by condensing 60 parts of the polyester (6) with 40 parts of a resin composed of aliphatic aldehydes and urea, having a softening point of from 95 to 100° C. and an acid number of about 1 mg/g. A paste resin PR10 having an acid number of 70 mg/g is prepared from 50 parts of a dimeric fatty acid having on average 36 carbon atoms and an acid number of about 190 mg/g (@Pripol 1017 from Unichema) and 50 parts of a resin composed of aliphatic aldehydes and urea, having a softening point of from 80 to 90° C. and an acid number of about 1.5 mg/g (@Laropal A81).

3 Performance testing of the pigment paste resins PR1 to PR10

In accordance with the figures in Table 3, the corresponding amounts of the respective pigments were dispersed in the following pigment paste solution in a bead mill and the dispersions were then subjected to a test of their storage properties.

250	parts of pigment paste resin, 40% in water
20	parts of Additol® VXX 6213 (wetting agent)
2	parts of Additol® VXX 6210 (defoamer)
3	parts of Additol® XL 297
	(anti-skinning agent for air-drying coatings binders)
100	parts of water
375	parts of pigment paste formulation

TABLE 3

Pigment	Pigment Paste Resin	Parts of pigment per 100 parts of PR	Viscosity in mPa · e	Storage test
P1 @Hostapermgelb H4G	PR1	175	1188	sat.
P2 @Novopermgelb H10GL	PR2	125	470	sat.
P3 @Novopermorange HL70	PR7	275	707	sat.
P4 @Permanent orange RL70	PR3	200	1102	sat.
P5 @Hostaperm rosa E	PR2	115	1714	sat.
P6 @Hostaperm red E5B	PR5	125	895	sat.
P7 @Novoperm red F5RK	PR6	150	774	sat.
P8 @Hostaperm violet RL spec.	PR2	125	417	sat.
P9 @Hostaperm blue AFL	PR6	150	325	sat.
P10 @Hostaperm green 8 G	PR5	250	455	sat.
P11 @KRONOS 2310	PR1	500	975	sat.
P12 @Bayferrox 130BM	PR4	500	1900	sl. sed.
P13 @Printex U	PR7	52.5	570	sat.
P14 @Paliotol yellow L 2140 HB	PR2	150	543	sat.
P15 @Paliotol red L 3550 HB	PR5	200	380	sat.
P16 @Heliogen blue L 6700 F	PR2	150	450	sat.
P17 @Heliogen green L 9361	PR5	250	575	sat.
P18 @Hostaperm violet RL spec.	PR8	125	463	sat.
P19 @Paliotol yellow L 2140 HB	PR9	150	521	sat.
P20 @Heliogen green L 9361	PR10	250	560	sat.

Pigment from Hoechst AG (1-10,18)

Pigment from Kronos Titan (11)

Pigment from Bayer AG (12)

Pigment from Degussa AG (13)

Pigment from BASF AG (14-17,19,20)

Storage test: Storage at room temperature for 6 months

sat.: satisfactory;

sl. sed.: slight sediment.

It can be seen that the paste resins prepared in accordance with the invention are stable on storage and have a high pigment binding capacity.

4 Paint testing

Coatings materials were prepared using the pigment paste P3, the pigment paste P11 and various aqueous binders, in the ratio indicated in Table 4 between the mass of the pigment paste (m_P) and the mass of the binder (m_B).

TABLE 4

Paint No.	L1	L2	L3	L4	L5	L6
Binder	a	b	c	d	a	d
Pigment paste	P11	P3	P3	P11	P3	P3
m_P/m_B	1:1	0.2:1	0.2:1	1:1	0.2:1	0.2:1

Binder a is an oxidatively drying, acrylic-modified alkyd resin in aqueous emulsion form (@Resydrol AY 586 w, Vianova Resins),

Binder b is an oxidatively drying, ammonia-neutralized acrylic-alkyd hybrid system in aqueous emulsion form (@Resydrol VAY 6278 w, Vianova Resins),

Binder c is an aqueous polyurethane dispersion (@Daotan VTW 1252, Vianova Resins),

Binder d is an epoxy resin-modified, non-drying alkyd resin which is dilutable in water following neutralization with amines (@Resydrol AX 246, Vianova Resins).

These paints were used to coat steel plates in a wet film thickness of 150 μ m. The test plates with the oxidatively drying paints were measured for gloss and haze using a BYK gonireflectometer following storage at room temperature (RT) for 48 hours and the König pendulum hardness (DIN 53157) following storage at room temperature for one and seven days, respectively, following application. The mechanical stability of the coatings was tested at a dry film thickness of from 30 to 35 μ m after storage at RT for 7 days by indentation testing in accordance with DIN EN ISO 1520 and by impacting testing in accordance with ASTM D 2794, the susceptibility to corrosion by water storage at 40° C. in accordance with ISO 2812 T2 and by the humid cabinet resistance (tropics test) in accordance with DIN 53210.

The test plates based on the stoving types (AX 246) were allowed to dry in air for 10 minutes following application, then dried at 80° C. for 10 minutes and subsequently stoved at 130° C. for 20 minutes. The tests were carried out one hour after stoving.

Comparison in each case was made using a steel plate coated with a directly pigmented comparative paint C1 to C6 (without paste resin) of the same binder. The results of paint testing are summarized in Table 5.

TABLE 5

Pendulum hardness in s						
Test paint	Gloss (20°)	Haze	after 1 d	after 7 d	Mechanical test	Corrosion test
L1	66	2.18	22	39	0	+
C1	67	2.25	22	39		
L2	61	2.14	39	37	0	0
C2	53	2.11	30	32		
L3	73	2.38	50	110	0	0
C3	68	2.32	50	72		
L4	82	2.09	156	148	—	0
C4	84	2.17	157	148		
L5	81	2.68	9	44	0	0
C5	80	2.61	11	37		
L6	87	2.33	167	171	—	0
C6	88	2.34	170	171		

0 no difference between the L and C samples

+ L sample is up to 10% better in the test than C sample

— L sample is up to 10% worse in the test than C sample

It is evident from these results that it is possible using the paste resins of the invention to prepare a series of very different low-solvent pigment pastes and with excellent results to pigment paints without adversely affecting the profile of performance properties of the paints.

Austrian Application A-1682, filed Oct. 6, 1997 for which priority is claimed under 35 U.S.C. §119, is herein incorporated by reference in its entirety.

Although only a few exemplary embodiments of this invention have been described in detail above, those skilled in the art will readily appreciate that many modifications are possible in the exemplary embodiments without materially departing from the teachings and advantages of this invention. Accordingly, all such modifications are intended to be included within the scope of this invention.

What is claimed:

1. A resin AB which is dilutable in water following neutralization and has an acid number of from 25 to 160 mg/g, obtained by reacting in a reaction mixture mass fractions, based in each case on the sum of the masses of the solids in the reaction mixture, of:

A from 30 to 90% of at least one acid-functional component selected from one or more of polyesters, one or more of dimerized and oligomerized unsaturated ali-

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phatic carboxylic acids, and one or more polymers of olefinically unsaturated monomers, each having an acid number of from 30 to 240 mg/g, and

B from 70 to 10% of at least one water-insoluble aldehyde resin or ketone resin obtained by condensing one or more ketones, one or more ketones together with one or more aldehydes, one or more ketones with a urea, or one or more aldehydes with a urea; each resin having a hydroxyl number from 20 to 300 mg/g, a softening point of from 60 to 140° C., and a number-average molar mass of from 500 to 3,000 g/mol,

the sum of the mass fractions of A and B in the reaction mixture being 100%.

2. An aqueous solution or dispersion of a resin AB according to claim 1, obtained by diluting the neutralized resin AB with water to a mass fraction of solids in the aqueous solution or dispersion of from 20 to 60%.

3. A resin according to claim 1, wherein a carboxyl-containing copolymer composed of olefinically unsaturated monomers, at least one of the monomers comprising one or more carboxyl groups, is employed as component A.

4. A resin according to claim 1, wherein A comprises a copolymer formed from a monomer mixture comprising mass fractions of

A1 from 10 to 33% of one or more monomers selected from the group consisting of an α,β -unsaturated aliphatic carboxylic acid having 3 to 13 carbon atoms, an olefinically unsaturated aliphatic dicarboxylic acid, and a monoalkyl ester of an α,β -unsaturated aliphatic dicarboxylic acid having 1 to 20 carbon atoms in the alkyl radical,

A2 from 67 to 90% of one or more olefinically unsaturated monomers which are free of acid groups, selected from the group consisting of esters of acrylic and methacrylic acid with aliphatic alcohols having 1 to 12 carbon atoms in the alkyl radical, styrene, vinyltoluene, acrylonitrile methacrylonitrile, hydroxyalkyl (meth)acrylates having 2 to 20 carbon atoms in the alkyl radical, and dialkyl esters of α,β -unsaturated aliphatic dicarboxylic acids having 1 to 20 carbon atoms in the alkyl radical, and

A3 from 0 to 50% of one or more mono- or polyunsaturated fatty acids having 14 to 30 carbon atoms, or their esters,

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the sum of the mass fractions of A1, A2, and A3 in the monomer mixture being 100%.

5. A resin according to claim 1, wherein component A comprises a carboxyl-containing polyester obtained by condensation of

A4 one or more dihydric aliphatic linear, branched or cyclic alcohols having 2 to 20 carbon atoms, and

A5 one or more dibasic aliphatic or aromatic carboxylic acids.

6. A resin according to claim 5, wherein of up to 10% of the amount of substance of component A4 is replaced by one or more aliphatic linear, branched or cyclic alcohols; each with three or more hydroxyl groups and having from three to 20 carbon atoms.

7. A resin according to claim 5, wherein up to 10% of the amount of substance of component A5 is replaced by an aliphatic or aromatic carboxylic acid having three or more carboxyl groups.

8. A resin according to claim 5, wherein the polyester is condensed with the concomitant use of mass fractions of up to 15% of one or more hydroxy carboxylic acids, each of which has at least one hydroxyl group and at least one carboxyl group.

9. A resin according to claim 1, wherein component A comprises a dimer or oligomer of a mono- or polyunsaturated aliphatic carboxylic acid having 6 to 30 carbon atoms.

10. A process for preparing a resin according to claim 1, comprising reacting components A and B at a temperature of from 100 to 250° C. until an acid number of from 25 to 160 mg/g is reached, optionally adding a water-dilutable solvent, and neutralizing the resulting resin in whole or in part with an aqueous solution of one or more of an alkali metal hydroxide, ammonia, or an amine.

11. A process for preparing a resin according to claim 10, wherein water formed during the reaction of components A and B is removed by azeotropic distillation.

12. A water-dilutable coating composition comprising or formed from a resin as claimed in claim 1.

13. A pigment paste resin comprising or formed from a resin as claimed in claim 1 and a pigment.

14. A resin AB as claimed in claim 1, wherein at least half of the acid groups have been neutralized.

15. A coating material comprising an aqueous binder and a resin as claimed in claim 1.

* * * * *

Application No.: 10/565,014
Appeal Brief dated February 22, 2011

Docket No.: 11885-00075-US

EXHIBIT D



UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/565,014	01/18/2006	Gerald Hobisch	11885-00075-US	5437
23416 7590 08/26/2010 CONNOLLY BOVE LODGE & HUTZ, LLP P O BOX 2207 WILMINGTON, DE 19899			EXAMINER DOLLINGER, MICHAEL M	
			ART UNIT	PAPER NUMBER
			1796	
			MAIL DATE	DELIVERY MODE
			08/26/2010	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/565,014	HOBISCH ET AL.	
	Examiner	Art Unit	
	MIKE DOLLINGER	1796	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 June 2010.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,4 and 6 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,4 and 6 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Objections

1. Claim 1 is objected to because of the following informalities: in line 30 there is an extra period after "the monomer mixture of A1 and A2". Appropriate correction is required.
2. Claim 1 is objected to because of the following informalities: in line 32 "alcoholshaving" should be "alcohols having". Appropriate correction is required.
3. Claim 4 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 4 limits the mass fraction of the monomers A1 in the mixture of monomers A1 and A2 to 10% to 33% but claim 1 already limits the mass fraction of monomers A2 in the monomer mixture A1 and A2 to 67% to 90%.

Claim Objections

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 4 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Staritzbichler et al (EP 0 272 524) in view of Tuemmler et al (US 6,114,434).

5. Staritzbichler discloses water dilutable lacquer bonding agents based on the partial condensation products of a water soluble polycarboxylic acid binder and a water insoluble polyhydroxyl component [paragraph 4] and the binder is made water dilutable by partial neutralization of carboxyl groups [paragraph 5]. The binder comprises (A) 10 to 90 weight percent of the polycarboxylic acid binder [paragraph 6] with an acid value of 50 to 280 mg KOH/g [paragraph 8] and (B) 10 to 90 weight percent of the polyhydroxyl binder [paragraph 6] with hydroxyl number between 50 and 300 mg KOH/g [paragraph 10]. The polyhydroxyl binder is prepared from the polycondensation of polyols, polycarboxylic acids or their anhydrides, and monocarboxylic acids with 5 to 20 carbon atoms [paragraph 11] which read on the claims aliphatic monobasic fatty acids. The partial condensation product of A and B has an acid value up to 20 units lower than the polycarboxylic binder A [paragraph 19] which corresponds to an acid value of 30 to 260 mg KOH/g. The inventive example includes a pigment past from 127.3 parts by weight of 33% solids content binder AB, 27 parts by weight deionized water, 60 parts by weight of titanium dioxide (a white pigment), 60 parts by weight of barium sulfate (a white pigment) and 0.2 parts by weight of flaming soot (carbon black, a black pigment) [paragraph 30] which corresponds to 15 parts by weight of dry (solids content) binder resin and 44 parts by weight of inorganic pigment per 100 parts by weight of pigment concentrate. Twenty percent of the binder before dilution with water is methoxypropoxypropanol [paragraphs 25 and 27] which corresponds to 3 parts by

weight of methoxypropoxypropanol solvent per 100 parts by weight of pigment concentrate. Examiner has also calculated the molecular weight of the (B) polyester from the hydroxyl number and assuming a functionality of 1 (which is reasonable considering the monocarboxylic acid terminators) and found that the molecular weight ranges to as low as 1122 g/mol. In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists. *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990), *In re Geisler*, 116 F.3d 1465, 1469-71, 43 USPQ2d 1362, 1365-66 (Fed. Cir. 1997).

6. Staritzbichler does not disclose the specific component A of the claims. However, Staritzbichler does disclose that the partial condensation product binder of A and B may also include formaldehyde condensates of melamine, urea, benzoguanamin, etc. [paragraph 16].

7. Tuemmler discloses water dilutable resins AB which are dilutable in water after neutralization and are the reaction products of A acid functional polymers and B water insoluble aldehyde or ketone resins obtainable by condensing aldehydes with urea [abstract]. The preferred embodiment of the polymer A comprises a copolymer formed from a monomer mixture comprising mass fractions of A1 from 10 to 33% of one or more monomers selected from the group consisting of an alpha,beta-unsaturated aliphatic carboxylic acid having 3 to 13 carbon atoms, and a monoalkyl ester of an alpha,beta-unsaturated aliphatic dicarboxylic acid having 1 to 20 carbon atoms in the alkyl radical, A2 from 67 to 90% of one or more olefinically unsaturated monomers

which are free of acid groups, selected from the group consisting of esters of acrylic and methacrylic acid with aliphatic alcohols having 1 to 12 carbon atoms in the alkyl radical, styrene, vinyl toluene, acrylonitrile, methacrylonitrile, hydroxyalkyl (meth)acrylates having 2 to 20 carbon atoms in the alkyl radical, and dialkyl esters of alpha,beta-unsaturated aliphatic dicarboxylic acids having 1 to 20 carbon atoms in the alkyl radical, and A3 from 0 to 50% of one or more mono- or polyunsaturated fatty acids having 14 to 30 carbon atoms, or their esters, the sum of the mass fractions of A1, A2, and A3 in the monomer mixture being 100% [col 3 line 53 through col 4 line7]. The invention is especially suitable as paste resins for preparing low-solvent and solvent-free pigment pastes. They feature a high pigment binding capacity, are stable on storage, and undergo little or no change in viscosity in the course of their storage in the pigment pastes produced from them. The amount of pigment that can be incorporated into these resins ranges from about 30 g to about 750 g of pigment per 100 g of resin AB, more typical from about 40 to about 600 g of pigment, and usually from about 50 to about 500 g of pigment [col 6 lines 9-21]. Before addition of pigments, minor amounts, i. e. between 0.5 and 10 g, of additives are usually added to the resin AB. These additives include, *inter alia*, wetting agents [col 6 lines21-24].

8. It would have been obvious to one having ordinary skill in the art the time the invention was made to have prepared a pigment concentrate comprising 40 to 70 weight percent inorganic pigment and 5 to 20 weight percent water dilutable condensation resin AB prepared by condensing a polycarboxylic acid polymer A from monomers A1, A2 and optionally A3 and hydrophobic polyester B comprising hydroxyl

groups because Staritzbichler teaches that it is within the skill of the art to a pigment concentrate comprising about 44 weight percent inorganic pigment and about 15 weight percent water dilutable condensation resin AB prepared by condensing a polycarboxylic acid polymer A and hydrophobic polyester B comprising hydroxyl groups and Tuemmler teach that it is within the skill of the art to prepare a pigment concentrate from a condensation resin AB prepared by condensing a polycarboxylic acid polymer A from monomers A1, A2 and optionally A3 and hydrophobic polymer B comprising hydroxyl groups. One would have been motivated to use the preferred polycarboxylic polymer A from Tuemmler as the polycarboxylic acid polymer A of Staritzbichler because Tuemmler teaches that the polycarboxylic acid A features a high pigment binding capacity, is stable on storage, and undergoes little or no change in viscosity in the course of storage in the pigment pastes produced therefrom. Absent any evidence to the contrary, there would have been a reasonable expectation of success using the polycarboxylic acid A of Tuemmler to prepare the pigment concentrate of Staritzbichler.

Response to Arguments

9. Applicant's arguments, see pages 4-8, filed 06/10/2010, with respect to Dworak et al (US 2002/0077389 A1) have been fully considered and are persuasive. The rejection of 12/15/2009 has been withdrawn.

10. Applicant's arguments, see pages 4-8, filed 06/10/2010, with respect to Dworak et al (US 2002/0077389 A1) in view of Awad et al (US 4,996,250) have been fully considered and are persuasive. The rejection of 12/15/2009 has been withdrawn.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MIKE DOLLINGER whose telephone number is (571)270-5464. The examiner can normally be reached on M-F 9-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy Gulakowski can be reached on 571-272-1302. The fax phone

number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/mmd/

/RANDY GULAKOWSKI/
Supervisory Patent Examiner, Art Unit 1796

Notice of References Cited	Application/Control No. 10/565,014	Applicant(s)/Patent Under Reexamination HOBISCH ET AL.	
	Examiner MIKE DOLLINGER	Art Unit 1796	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-6,114,434 A	09-2000	Tuemmler et al.	524/512
	B	US-			
	C	US-			
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N	EP 272524 A	06-1988	European Patent	DWORAK G et al.	
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	Machine Translation of EP 272524 A
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Application No.: 10/565,014
Appeal Brief dated February 22, 2011

Docket No.: 11885-00075-US

EXHIBIT E

OK TO ENTER: /M.D./

11/30/2010

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

PATENT

Docket No. 11885-00075-US

In re Patent Application of

Gerald TOBISCH *et al.*

Serial No. 10/565,014

Group Art Unit: 1796

International Filing Date: July 13, 2004

371 (c) Date: January 18, 2006

Examiner: Michael M. DOLLINGER

For: Utilization of Water-Dilutable Condensation Resins As Water-Dilutable Dispersing Agent for Pigment Concentrates

AMENDMENT AND REQUEST FOR RECONSIDERATION
UNDER 37 C.F.R. § 1.111

MAIL STOP AMENDMENT

The Hon. Commissioner for Patents

P. O. Box 1450

Alexandria, VA 22313-1450

Sir:

In response to the Final Office Action in the captioned case mailed August 26, 2010, applicants herewith request reconsideration and withdrawal of the outstanding rejection in view of the following amendments and remarks.

Amendments to the Claims begin on page 2 of this paper.

Arguments begin on page 5 of this paper.

OK TO ENTER: /M.D./

11/30/2010

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

PATENT
Docket No. 11885-00075-US

In re Patent Application of
Gerald HOBISCH *et al.*
Serial No. 10/565,014
International Filing Date: July 13, 2004
371 (c) Date: January 18, 2006

Group Art Unit: 1796

Examiner: Michael M. DOLLINGER

For: Utilization of Water-Dilutable Condensation Resins As Water-Dilutable Dispersing
Agent for Pigment Concentrates

AMENDMENT AND REQUEST FOR RECONSIDERATION
UNDER 37 C.F.R. § 1.111

MAIL STOP AMENDMENT
The Hon. Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

Sir:

In response to the Final Office Action in the captioned case mailed August 26, 2010,
applicants herewith request reconsideration and withdrawal of the outstanding rejection in
view of the following amendments and remarks.

Amendments to the Claims begin on page 2 of this paper.

Arguments begin on page 5 of this paper.

1 IN THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in this application.

Listing of Claims:

1. (currently amended) A method of use of water-dilutable condensation resins AB as dispersing agents for pigments, comprising mixing the said pigments and the said condensation resins AB to prepare pigment concentrates wherein in the case of inorganic pigments, 100 g of the pigment concentrate comprise from 40 g to 70 g of inorganic pigment, from 5 g to 20 g of the condensation resin AB, up to 10 g of a wetting agent and up to 10 g of a solvent; wherein in the case of organic pigments, 100 g of the pigment concentrate comprise from 20 g to 40 g of organic pigment, from 5 g to 40 g of the condensation resin AB, and up to 10 g of a wetting agent and up to 10 g of a solvent; and wherein in the case of carbon black pigments, 100 g of the pigment concentrate comprise from 15 g to 30 g of carbon black, from 10 g to 30 g of the condensation resin AB, up to 10 g of a wetting agent and up to 10 g of a solvent, wherein the condensation resins AB have an acid number of from 20 mg/g to 180 mg/g and are obtainable by condensation at a temperature of from 100 °C to 220 °C under formation of water which escapes at the reaction temperature, of components A containing acid groups and having an acid number of from 30 mg/g to 240 mg/g, which are copolymers of olefinically unsaturated monomers which monomers comprise monomers A1 which contain acid groups and are chosen from alpha,beta-unsaturated carboxylic acids

having 3 to 13 carbon atoms which are selected from the group consisting of acrylic and methacrylic acid, crotonic and isocrotonic acid, vinyl acetic acid, 3-propylacrylic acid, and 2-octenoic acid, and monoalkyl esters of unsaturated dicarboxylic acids having from 1 to 20 carbon atoms in the alkyl radical, monomers A2 which are free of acid groups and are selected from the group consisting of alkyl esters of monobasic alpha, beta-unsaturated aliphatic carboxylic acids having 3 to 7 carbon atoms in the acid component and 1 to 20 carbon atoms in the alkyl component; the dialkyl esters of alpha, beta-unsaturated aliphatic dicarboxylic acids having 4 to 8 carbon atoms in the acid component and 1 to 20 carbon atoms in the alkyl component; the nitriles of the acids mentioned; the hydroxyalkyl esters of the monobasic alpha, beta-unsaturated aliphatic carboxylic acids mentioned having 3 to 7 carbon atoms in the acid component and 2 to 20 carbon atoms in the hydroxyalkyl component, also including oligo-oxyalkylene glycol monoesters having a number-average degree of polymerisation of from 2 to 50, the alkylene groups of which are selected from the ethylene and 1,2-propylene groups and mixtures thereof; and the vinylaromatics and the vinyl esters of saturated aliphatic linear and branched monocarboxylic acids having 2 to 20 carbon atoms, the monomers A2 being employed in mass fractions of from 67 % to 90 %, based on the mass of the monomer mixture of A1 and A2; A2 and monomers A3 which are mono- or polyunsaturated fatty acids having from 14 to 30 carbon atoms in the alkyl groups or esters thereof with aliphatic ~~alcohols~~ alcohols having from 1 to 20 carbon atoms in the alkyl groups, which monomers A3 are present in the monomer mixture of A1, A2, and A3 in a mass fraction of up to 50 %, on the one hand, and hydrophobic polyesters B ~~made from~~ obtained by polycondensation of aliphatic monobasic and dibasic carboxylic acids B2 having from four to forty carbon atoms, and dihydric aliphatic linear, branched or cyclic alcohols B1 having from two to twenty carbon atoms, the said polyesters B containing

hydroxyl groups and having a hydroxyl number of from 20 mg/g to 300 mg/g and a number-average molar mass M_n of from 500 g/mol to 5,000 g/mol, and the mass fraction of component A in the reaction mixture for the synthesis of the condensation resins AB is 30 % to 90 % and that of component B is 70 % to 10 %, with the proviso that the sum of the mass fractions of the two components always gives 100 %, and wherein the aliphatic monobasic acids are fatty acids.

2. to 5. (cancelled)

6. (original)

The method of use of claim 1, characterised in that the condensation resins AB are neutralised and dispersed in water before the mixing with pigments.

7. (cancelled)

REMARKS**Introduction***Status of claims*

Claims 1, 4, and 6 are pending in the application.

Claims 1, 4, and 6 have been rejected.

Claim 1 has been currently amended.

Claim 4 has been cancelled

Amendments to Claims

Claim 1 has been amended by inserting the choice of acid group-containing monomers of page 2, last paragraph starting with "Preferably, the acid group-containing monomers ...", lines 5 to 7, deleting the extra period in line 30, and by correcting to "alcohols having" in line 32. Claim 1 has further been amended by defining the polyesters **B** as being obtained by polycondensation of monomers B1 and B2, and also introducing the limitations for the number of carbon atoms as set out in page 4, second paragraph. Claim 4 has been cancelled.

It is deemed that no new matter has been added by such amendments. It is also deemed that no further search or consideration will be necessitated by this amendment as there is only a restriction fully based on the specification, and entry thereof is therefore respectfully requested.

The Office Action

Claims 1, 4, and 6 have been rejected under 35 U. S. C. 103 (a) as being unpatentable over the the Staritzbichler et al. reference, EP 0 272 524 A2, in view of Tuemmler et al., US 6,114,434. The applicant respectfully traverses this rejection.

The Staritzbichler reference discloses a process to prepare a water-dilutable binder which is a partial condensation product of an addition product (A) of maleic acid or its anhydride and an unsaturated oil or fatty acid, and one or more hydroxy-functional resins which are water-insoluble. The one or more hydroxy-functional resins comprise a mass fraction of at least 30 % of fatty acid-modified polycondensation or polyaddition products (B) which have at least 0.5 mol / kg of a substituted urea group, and also, urethane groups, and which have an acid number of less than 5 mg KOH / g and a Staudinger index ("limiting viscosity number") of from 8 ml/g to 13 ml/g, and up to a mass fraction of 70 % of polyhydroxyl compounds (C) which correspond to the definition of (B) with the exception of the presence of substituted urea groups. The addition product (A) has a mole fraction of preferably from 10 % to 30 % of maleic acid or its anhydride. The components (A), (B) and (C) are condensed at a temperature of from 90 °C. to 150 °C. up to a Staudinger index of from 10 ml/g to 20 ml/g, in a way that the ratio of the values of the Staudinger index of the polyhydroxyl components to that of the polycarboxyl components is between 1.4 and 2.7, and that the condensation product has at least 0.3 mol of substituted urea groups. See page 1, lines 28 to 48.

As the Examiner has correctly stated in paragraph no. 6 of the Office Action, the Staritzbichler reference does not disclose the mandatory presence of monomers A2 in the acid component according to the present invention; in fact, it does not even mention them anywhere as being useful for the invention taught in Staritzbichler. On the other hand, the acid component A of the present invention as fully defined in claim 1 does not read on the acid components described in the Staritzbichler reference as these mandatorily comprise urethane groups.

The Tuemmler reference discloses condensation products of aldehyde or ketone resins B having a hydroxyl number of from 10 mg/g to 350 mg/g, preferably, 20 mg/g to 300 mg/g, (col. 2, lines 3-10) and of acid functional components A selected from the group consisting of polyesters, dimerised or oligomerised unsaturated aliphatic carboxylic acids, and polymers of olefinically unsaturated monomers, each having an acid number of from 30 mg/g to 270 mg/g (col. 1, lines 60-67).

The hydroxyl group-containing polyesters B of the present invention do not have anything in common with the ketone or aldehyde resins of Tuemmler.

A statement that modifications of the prior art to meet the claimed invention would have been "obvious to one of ordinary skill in the art at the time the invention was made" because the references relied upon teach that all aspects of the claimed invention were individually known in the art is not sufficient to establish a *prima facie* case of obviousness without some objective reason to combine the teachings of the references. *Ex parte Levengood*, 28 USPQ2d 1300 (Bd. Pat. App. & Inter. 1993). See MPEP § 2143.01 IV. "[R]ejections on obviousness cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *KSR International Co. v. Teleflex Inc.*, 82 USPQ2d 1385, 1396 (2007) quoting *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006). Furthermore, the Examiner cannot selectively pick and choose from the disclosed parameters without proper motivation as to a particular selection. The mere fact that a reference may be modified to reflect features of the claimed invention does not make the modification, and hence the claimed invention, obvious unless the prior art suggested the desirability of such modification. *In re Mills*, 916 F.2d 680, 682, 16 USPQ2d 1430 (Fed. Cir. 1990); *In re Fritch*, 23 USPQ2d 1780 (Fed. Cir. 1992). Thus, it is impermissible to simply engage in a hindsight reconstruction of the claimed invention where the reference itself provides no teaching as to why the applicant's

combination would have been obvious. *In re Gorman*, 933 F.2d 982, 987, 18 USPQ2d 1885, 1888 (Fed. Cir. 1991).

The acid group-containing components A of the Staritzbichler reference (addition products of maleic acid or its anhydride to unsaturated oils or fatty acids) and the acid group-containing components of the Tuemmler reference are entirely different, as are also the hydroxyl group-containing components B of Staritzbichler which must have urethane groups while the hydroxy group-containing component of Tuemmler is an aldehyde or ketone resin.

Therefore, not only is there no teaching, suggestion or motivation to combine the teachings of the cited references, there is also no reasonable expectation for a person of ordinary skill in the art that such combination would possible solve a new problem. And even if such combination would have been made, this would and could not have led to the present invention.

Accordingly, the person of ordinary skill in the art would not and could not combine these references to arrive at the subject matter of the present invention. For the above reasons, this rejection should be withdrawn.

In view of the above response, applicant believes the pending application is in condition for allowance.

Applicant believes no additional fee is due with this response. However, if a fee is due, please charge our Deposit Account No. 03 2775, under Order No. 32007 00018 US from which the undersigned is authorized to draw.

Dated: November 26, 2010

Respectfully submitted,

Electronic signature

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Registration No.: 35,646

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Application No.: 10/565,014
Appeal Brief dated February 22, 2011

Docket No.: 11885-00075-US

EXHIBIT F



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/565,014	01/18/2006	Gerald Hobisch	11885-00075-US	5437
23416 7590 12/06/2010 CONNOLLY BOVE LODGE & HUTZ, LLP P O BOX 2207 WILMINGTON, DE 19899			EXAMINER DOLLINGER, MICHAEL M	
			ART UNIT 1766	PAPER NUMBER
			MAIL DATE 12/06/2010	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Advisory Action Before the Filing of an Appeal Brief	Application No.	Applicant(s)	
	10/565,014	HOBISCH ET AL.	
	Examiner	Art Unit	
	MIKE DOLLINGER	1766	

--The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

THE REPLY FILED 26 November 2010 FAILS TO PLACE THIS APPLICATION IN CONDITION FOR ALLOWANCE.

1. ☒ The reply was filed after a final rejection, but prior to or on the same day as filing a Notice of Appeal. To avoid abandonment of this application, applicant must timely file one of the following replies: (1) an amendment, affidavit, or other evidence, which places the application in condition for allowance; (2) a Notice of Appeal (with appeal fee) in compliance with 37 CFR 41.31; or (3) a Request for Continued Examination (RCE) in compliance with 37 CFR 1.114. The reply must be filed within one of the following time periods:

- a) ☒ The period for reply expires 3 months from the mailing date of the final rejection.
- b) ☐ The period for reply expires on: (1) the mailing date of this Advisory Action, or (2) the date set forth in the final rejection, whichever is later. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of the final rejection.

Examiner Note: If box 1 is checked, check either box (a) or (b). ONLY CHECK BOX (b) WHEN THE FIRST REPLY WAS FILED WITHIN TWO MONTHS OF THE FINAL REJECTION. See MPEP 706.07(f).

Extensions of time may be obtained under 37 CFR 1.136(a). The date on which the petition under 37 CFR 1.136(a) and the appropriate extension fee have been filed is the date for purposes of determining the period of extension and the corresponding amount of the fee. The appropriate extension fee under 37 CFR 1.17(a) is calculated from: (1) the expiration date of the shortened statutory period for reply originally set in the final Office action; or (2) as set forth in (b) above, if checked. Any reply received by the Office later than three months after the mailing date of the final rejection, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

NOTICE OF APPEAL

2. ☐ The Notice of Appeal was filed on _____. A brief in compliance with 37 CFR 41.37 must be filed within two months of the date of filing the Notice of Appeal (37 CFR 41.37(a)), or any extension thereof (37 CFR 41.37(e)), to avoid dismissal of the appeal. Since a Notice of Appeal has been filed, any reply must be filed within the time period set forth in 37 CFR 41.37(a).

AMENDMENTS

3. ☐ The proposed amendment(s) filed after a final rejection, but prior to the date of filing a brief, will not be entered because
- (a) ☐ They raise new issues that would require further consideration and/or search (see NOTE below);
- (b) ☐ They raise the issue of new matter (see NOTE below);
- (c) ☐ They are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal; and/or
- (d) ☐ They present additional claims without canceling a corresponding number of finally rejected claims.

NOTE: _____. (See 37 CFR 1.116 and 41.33(a)).

4. ☐ The amendments are not in compliance with 37 CFR 1.121. See attached Notice of Non-Compliant Amendment (PTOL-324).
5. ☐ Applicant's reply has overcome the following rejection(s): _____.
6. ☐ Newly proposed or amended claim(s) _____ would be allowable if submitted in a separate, timely filed amendment canceling the non-allowable claim(s).
7. ☒ For purposes of appeal, the proposed amendment(s): a) ☐ will not be entered, or b) ☒ will be entered and an explanation of how the new or amended claims would be rejected is provided below or appended.
- The status of the claim(s) is (or will be) as follows:
- Claim(s) allowed: _____.
- Claim(s) objected to: _____.
- Claim(s) rejected: 1 and 6.
- Claim(s) withdrawn from consideration: _____.

AFFIDAVIT OR OTHER EVIDENCE

8. ☐ The affidavit or other evidence filed after a final action, but before or on the date of filing a Notice of Appeal will not be entered because applicant failed to provide a showing of good and sufficient reasons why the affidavit or other evidence is necessary and was not earlier presented. See 37 CFR 1.116(e).
9. ☐ The affidavit or other evidence filed after the date of filing a Notice of Appeal, but prior to the date of filing a brief, will not be entered because the affidavit or other evidence failed to overcome all rejections under appeal and/or appellant fails to provide a showing of a good and sufficient reasons why it is necessary and was not earlier presented. See 37 CFR 41.33(d)(1).
10. ☐ The affidavit or other evidence is entered. An explanation of the status of the claims after entry is below or attached.

REQUEST FOR RECONSIDERATION/OTHER

11. ☒ The request for reconsideration has been considered but does NOT place the application in condition for allowance because: see attached detailed action.
12. ☐ Note the attached Information *Disclosure Statement*(s). (PTO/SB/08) Paper No(s). _____
13. ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Applicants have amended claim 1 to more narrowly define monomers A1 to alpha,beta-unsaturated acids with 3 to 13 carbon atoms chosen from the group consisting of methacrylic acid, crotonic and isocrotonic acid, vinyl acetic acid, 3-propylacrylic acid and 2-octenoic acid. This amendment does not overcome the rejection of Staritzbichler in view of Tuemmler because Tuemmler discloses that suitable acid functional monomers A1 include acrylic and methacrylic acid, crotonic and isocrotonic acid, vinylacetic acid, 3-propylacrylic acid, and 2-octenoic acid [col 3 lines 16-19].
2. Applicants have also amended claim 1 to narrow the scope of mono and dibasic carboxylic acid B2 to having from four to forty carbon atoms and narrow the scope of alcohols B1 to dihydric aliphatic linear, branched or cyclic alcohols having from two to twenty carbon atoms. These amendments do not overcome the rejection of Staritzbichler in view of Tuemmler because Staritzbichler discloses that the polycarboxylic acids of B include adipic and sebacic acid; the monocarboxylic acids have 5 to 20 carbon atoms; and the polyols include mono-, di- and tri-ethylene glycol [page 1 paragraph 12].

Response to Arguments

3. Applicant's arguments filed 11/26/2010 have been fully considered but they are not persuasive.

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4. Applicants argue that one having ordinary skill in the art would not have replaced the acid polymer A of Staritzbichler with the acid polymer A Tuemmler because the polymer A of Tuemmler is designed to react with a polymer B that is a ketone or aldehyde resin whereas the acid polymer A of Staritzbichler is designed to react with a polyester B. Applicants argue that the hydroxyl group containing polyesters B of the present invention do not have anything in common with the ketone or aldehyde resins B of Tuemmler. Applicants argue that Examiner is merely combining prior art elements without any objective reason to do so and is henceforth using hindsight from applicants' invention. This argument is not convincing. The composition of Staritzbichler discloses an acid functional polymer A in combination polyesters B and optionally component C which includes formaldehyde condensates of melamine and urea [page 2 paragraph 2]. So Staritzbichler can be considered the same type of composition of Tuemmler with an additional polyester component and one having ordinary skill in the art would consider some of their components interchangeable and analogous art. Examiner has also provided motivation for using the polymer A of Tuemmler: One would have been motivated to use the preferred polycarboxylic polymer A from Tuemmler as the polycarboxylic acid polymer A of Staritzbichler because Tuemmler teaches that the polycarboxylic acid A features a high pigment binding capacity, is stable on storage, and undergoes little or no change in viscosity in the course of storage in the pigment pastes produced therefrom. Examiner does not need to rely on hindsight when the prior art gives clear motivation to combine the prior art references and arrive at the instantly claimed invention.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MIKE DOLLINGER whose telephone number is (571)270-5464. The examiner can normally be reached on M-F 9-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy Gulakowski can be reached on 571-272-1302. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/mmd/

/David Buttner/
Primary Examiner, Art Unit 1765